Mitigation Plan for Stream and Wetland Impacts

Warden Waste Site Ohio County, Kentucky

Prepared for:

Armstrong Coal Company 407 Brown Road Madisonville, KY 42431

Prepared by:



2331 Fortune Drive, Suite 295 Lexington, Kentucky 40509 (859) 263-0009

September 9, 2014

Stream and Wetland Mitigation Plan

On-site Mitigation

Section C of PCN	Pages 1-9
Vicinity Map	Exhibit 1
Proposed On-site Stream Mitigation Locations	Exhibits 2-3
Ephemeral Typical Plan / Cross Sections	Exhibits 4-9
Intermittent Typical Plan / Cross Sections	Exhibits 10-13
Rosgen Stream Type "Aa+" - Typical Plan and Profile	Exhibit 14
Rosgen Stream Type "B" and "Ba" - Typical Plan and Profile	Exhibits 15-16
Stream Structures and Planting Details	Exhibits 17-19
Table of Existing and Proposed Stream Lengths	Exhibit 20
Off-site Mitigation	
Section C of PCN	Pages 10-20
Existing Off-site Resources	Table 1
Vicinity Map	Exhibit 21
Existing Off-site Stream & Wetland Locations	Exhibit 22
Mitigation Plan Overview	Exhibit 23
Mitigation Plan Index and Sheets	Exhibits 24-26
Proposed Restoration Stream Profile	Exhibits 27-29
Stream Structures Details	Exhibits 30-31
Stream and Wetland Planting Details	Exhibits 32-33
Stream Assessments / Photographs	Appendix
Wetland Forms / Photographs	Appendix
Summary of All Proposed Mitigation	Table 2
JUITINALY OF ALL PTUDUSEU WILLUAUUT	rable z

C. Compensatory Mitigation: Warden Waste Site

On-Site Mitigation

(1) Goals and Objectives

Streams will be restored on-site and will perform the same functions as the existing streams as described in the baseline report. The goal of the stream mitigation will be to provide in-stream habitat and to construct stable stream systems that convey the bankfull discharge and sediment supplied by the watershed. For the on-site restored streams, dimensions, patterns, and profiles will be constructed so as to create stream types that would naturally occur within the proposed valleys and hydrologic conditions. Existing wetland functions are described in the baseline report. Mitigation for wetlands will occur on an off-site location; please refer to the Off-Site Mitigation section of this report for information.

(2) Site Selection

The on-site streams to be mitigated are all within the Elk Creek watershed, in an area where temporary top soil/cover material storage is proposed for use in the reclamation of the waste disposal development site. This area will not be mined, and once the material is removed during reclamation, it will allow for streams to be restored in their approximate original locations with similar drainage areas and gradients.

(3) Baseline Information

- (a) On-site mitigation will consist of restoring entire reaches of intermittent streams and ephemeral tributaries; focusing on reestablishing the watersheds with existing stream locations and drainage patterns. Wetlands will be both created and preserved on the off-site mitigation area to be discussed later in this report.
- (b) It is proposed that a total of 4,173 feet of ephemeral and 2974 feet of intermittent stream will be restored on-site.
 - (c) The aquatic resource type includes ephemeral and intermittent and wetlands.
- (d) Please refer to the "Stream Habitat Assessment and Wetland Delineation Report" prepared for Armstrong Coal Company, dated January 18, 2013, for existing conditions of onsite streams. The on-site (and off-site mitigation site) is located within two twelve-digit Hydrologic Unit Codes (HUC's); the Elk Creek-Green River (051100030505) and Nelson Creek-Green River (051100030504). According to NRCS climate data, the region receives approximately 48 inches of rainfall per year

(4) Mitigation Work Plan

- (a) Boundaries of the proposed mitigation sites are provided in the exhibits.
- (b) On-site stream construction will be conducted concurrently with the reclamation phase of the project. Stream construction will be integrated within valleys having characteristics corresponding to appropriate stream types. Valley morphology will consist of landform features that will correspond to proposed stream system morphology including meander planform (radius of curvature, wavelength, belt width and sinuosity), channel profile morphology (riffle/pool or step/pool bed features) and cross section dimensions (low flow, bankfull and flood prone).

On-site stream construction sequence will be as follows:

- 1. Locate and flag proposed thalweg.
- 2. Excavate corresponding bankfull width to bankfull elevation as indicated on plans.
- 3. Excavate bankfull channel to dimensions indicated on profile and cross sections.
- 4. Grade side slopes to obtain appropriate flood prone width.
- 5. Grade side slopes to tie into existing ground.
- 6. Install in-stream structures.
- 7. Add substrate in riffle and run sections if necessary to provide armoring and riffle habitat.
- 8. Prepare streambanks and riparian area for seeding.
- 9. Seed area with native seed mixture as indicated on planting detail sheet.
- 10. Install erosion control blanket as needed.
- 11. Plant USACE approved trees and shrubs.
- (c) Proposed on-site streams will have similar drainage patterns and connectivity as existing conditions.
- (d) For on-site stream restoration native vegetation to be planted along stream banks and riparian zones include the following species or species available at the time of ordering and approved by USACE:
- Grasses Virginia wild rye (*Elymus virginicus*), Switchgrass (*Panicum virgatum*), Rough barnyard grass (*Echinochloa muricata*), Big bluestem (*Andropogon gerardii*), Forking panic grass/smooth panic grass (*Dichanthelium dichotomum/dichotomiflorum*) and Annual rye (*Lolium perenne*).
- Shrubs Rough-leaf dogwood (*Cornus drummondii*), Strawberry bush (*Euonymus americanus*), and Indigo-bush (*Amorpha fruticosa*). Shrubs will be 3-gallon container grown, planted on a four foot spacing along the streambanks at the bankfull elevation where needed to aid in bank stabilization.

Trees – For intermittent streams: Shellbark hickory (*Carya laciniosa*), Willow oak (*Quercus phellos*), Cherrybark oak (*Quercus pagoda*), Water oak (*Quercus nigra*), and White oak (*Quercus alba*). For ephemeral streams: Shagbark hickory (*Carya glabra*), American beech (*Fagus grandifolia*), Shingle oak (*Quercus imbricaria*), Post oak (*Quercus stellata*), and Shumard oak (*Quercus shumardii*). Trees will be either 3-gallon container grown RPM planted at a rate of 60 trees per acre, or 3-gallon non-RPM planted at a rate of 120 trees per acre, or non-RPM bare root seedlings (minimum of 30 inches in height) planted at a rate of 450 stems per acre. The option utilized will be dependent on plant availability at the time of mitigation planting (if plant availability is not an issue, more than one option may be utilized to compare survival rates for future mitigation projects). In addition, a single row of shrubs will be planted along edge of stream just above bankfull elevation where needed to aid in bank stabilization. Shrub spacing will be approximately four feet on average with higher densities at high shear locations (ex. outside bends).

Per Kentucky Division of Mine Permits (KDMP) requirements: planting of woody species will occur during first dormant season following stream restoration.

- (e) Any vegetation that would hinder planting or provide excessive competition to natural regeneration of planted species will be removed with appropriate treatment and documented in each annual monitoring report.
- (f) Exotic vegetation control: The following efforts will be made to reduce introduction and dispersal of invasive species: removal of exotic species before mitigation begins, cleaning equipment before it reaches the site, inspecting labels on seed mixtures and mulch for composition and vegetative monitoring during the required monitoring period. Volunteers, invasives, and/or exotic vegetation along riparian zones or within created wetland areas will be removed by mowing, digging, spraying, burning or a combination of these during annual maintenance; and documented in each annual monitoring report.
- (g) Proposed mitigation plan sheets provide elevation and slope details for the restored stream designs, and details on specific enhancement efforts and wetland creation.
- (h) Erosion control methods will consist of the following: constructing or enhancing stream channels during low or no flow periods, allowing vegetation to become established before flow is allowed into the stream restoration channels, applying seed and installing erosion control blanket immediately after final grading, planting trees and shrubs and installing silt fence as needed. Stream restoration and enhancement will proceed in a downstream direction to avoid re-suspension of sediment.

- (i) Proposed stream restoration and stream enhancement designs are based on geomorphic and hydrologic principles incorporated with natural channel design techniques utilizing in-stream structures for habitat diversity and stream bank protection.
- (j) Proposed Stream Plans will indicate stream type, pattern, profile and dimensions for each stream. Stream morphology was determined by using regional curve data, collecting and studying data from the existing streams, sediment transport and hydrologic calculations, and experience designing and constructing streams.
- (k) Natural channel design methods, in-stream structures, and habitat enhancement features will be incorporated into the mitigation plan. Habitat enhancement features will consist of cover logs, log overhangs, submerged logs, and log/rock vane structures. These features will also provide bank stability while vegetation becomes established. Stream enhancement efforts will also include the installation of grade control structures to raise incised streambeds in order to promote reconnection to the floodplain. This effort will allow for establishment of wetlands in the floodplain of those streams. For the stream restoration efforts, the substrate will consist of soils used during reclamation. If it is determined during the stream construction that adequate riffle material is not present, then appropriately sized material will be supplied to riffle and run sections.
- (I) Mitigation sites will be permanently protected and maintenance will be provided as needed, throughout the monitoring period. Site protection will be provided through use of a restrictive covenant. Maintenance will include elimination of volunteer species by use of general or spot applications of herbicides, hand picking and mowing, where appropriate.
- (m) A representative from the design team will be on site during critical phases of the construction process. The representative will make periodic site visits and will familiarize construction personnel with design plans and restoration methods.

(5) Performance Standards/Success Criteria

- (a) Standards for assessing stream mitigation goals include:
- 1. Streams to be restored on-site must be constructed to meet the dimension, pattern and profile of the indicated Rosgen Stream Type.
- 2. There should be no signs of excessive stream bank erosion or severe headcutting.
- 3. At the end of the monitoring period, the streams shall have average riffle cross section dimensions reflective of the indicated Rosgen Stream Type.
- 4. At the end of the monitoring period, the restored on-site streams shall have minimum EPA Rapid Bioassessment Protocol scores in the sub-optimal range.

- 5. Root Production Method (RPM) trees will be planted at a rate of 60 trees per acre, or non-RPM 3-gallon container grown will be planted at a rate of 120 trees per acre, or bare root seedlings (minimum height of 30 inches) will be planted at a rate of 450 trees per acre. The option utilized will be dependent on plant availability at the time of mitigation planting (if plant availability is not an issue, more than one option may be utilized to compare survival rates for future mitigation projects).
- 6. Riparian vegetation shall have at least an 80% survival rate of the initial planting of non-RPM or bare root seedlings; with no single planted tree species constituting more than 25 percent of the surviving species. The survival rate for RPM plantings is 90 percent. No one species shall comprise more than 25 percent of the surviving RPM plantings.
- 7. Riparian vegetation will consist of no volunteer tree species at the end of the monitoring period.
- 8. Per Kentucky Division of Mine Permits (KDMP) requirements: one measure of project success will be final stream assessment scores that equal or exceed pre-project scores.
- 9. In the riparian areas, herbaceous plantings must provide a minimum of 70 percent ground cover; with no one species accounting for more than 40 percent ground cover.
- 10. Linear footage and flow regimes will match the USACE approved mitigation plan.
- 11. Streams will have a definable bed and bank, with an Ordinary High Water Mark.
- 12. Stream channel and in-stream structures must be stable and functioning as designed.
- 13. Stream morphology must meet the proposed Rogsen classification (i.e., stream slope, sinuosity, belt width, meanders, bankfull cross-sectional area, width/depth ratios).
- 14. Annual monitoring should indicate that mitigation is progressing toward meeting success criteria.

(b) Adaptive Management

If success criteria are not met during the monitoring period, an analysis of the contributing conditions will be conducted and documented. Remedial action, if required by USACE, will be performed and documented by the applicant. Remedial actions may include replanting trees and shrubs, reseeding grasses, adjusting in-stream structures and repairing eroded banks. These actions will be performed at least twice, depending on the nature of the problem. Should these efforts not resolve the issue, another site will be found to replace failed sections of the mitigation sites. The contingency plan for proposed ephemeral and intermittent streams will be payment of in-lieu fees. For intermittent streams, contingency payment will be based on the length of stream that does not support intermittent hydrology during the monitoring period. For ephemeral streams, it is based on the length of stream of channel that does not meet performance standards.

(c) Project Performance Evaluations

All stream and wetland sites will be monitored in accordance with the Mitigation Final Rule, 2008. In general, the following guidelines will be used:

- 1. The monitoring period must be sufficient to demonstrate that the compensatory mitigation has met performance standards. The monitoring period length shall be a minimum of five years unless performance standards are met in less than five years. In this case, the monitoring period length can be reduced if there are at least two consecutive monitoring reports that demonstrate that performance standards have been met. Longer monitoring timeframes are necessary for compensatory mitigation projects that take longer to develop.
- 2. Biannual inspections will be conducted each year during the first and last month of the growing season.
- 3. The first monitoring report will be due after the first full growing season following the initial planting.
- 4. Monitoring reports are due to USACE by January 31 for the previous year, and to the Kentucky Division of Mine Permits (KDMP) by December 31 for the same monitoring year.
- 5. Photo stations and monitoring stations will be at the same location.
- 6. Permanent photo/monitoring stations will be set at a minimum of 1 per 1500 feet of ephemeral stream, and 1 per 500 feet of intermittent and perennial stream.
- 7. The same monitoring stations shall be used every year.
- 8. Personnel familiar with natural stream design principles will perform monitoring tasks.
- 9. Stream monitoring will consist of assessing stream parameters and documenting vegetation survival.
- 10. Stream channel form and in-stream structure stability will be monitored to ensure stream functionality. Maintenance will be performed if the following conditions develop: excessive bank erosion occurs (RBP scores in the marginal range for bank stability), erosion around or under structures that would render them ineffective or cause structure collapse, excessive siltation of pools reducing their effectiveness in reducing energy and/or adversely affecting pool habitat, and upstream directed vertical bed erosion (headcut) that would jeopardize structure stability and lead to unstable channel conditions (RBP scores in marginal range for epifaunal/substrate cover or sediment deposition). Stream conditions will be inspected frequently by design and/or stream construction team. Stream channel maintenance will be performed as needed to ensure stream stability, function and value.
- 11. Water quality monitoring will be conducted in accordance with the approved SMCRA/KPDES permit, which states:

Beginning at the time of initial disturbance within the respective watershed, grab samples will be collected from the KPDES point twice each month during the active permit operation phase and reclamation phase and will continue until Phase I bond release. After Phase I bond release, monitoring at the discharge point will be on a once per month basis for six months followed by quarterly sampling thereafter (unless specifically disallowed by the regulatory authorities) continuing until final bond release or when KPDES monitoring is otherwise no longer required by the regulatory authorities.

Prior to Phase I bond release the parameters to be monitored at the discharge point will be, when appropriate: flow (estimated), acidity, alkalinity, total iron, total manganese, pH, total suspended solids and settleable solids. After Phase I bond release the parameters to be monitored will be: flow (estimated), pH, acidity, alkalinity, and settleable solids (when acceptable and appropriate total suspended solids may be analyzed instead of settleable solids). Discharge limitations for these parameters will be as specified in the KPDES permit issued for the discharge.

Monitoring results obtained during the previous three months will be summarized for each discharge for each month and reported on a Discharge Monitoring Report Form, as required. Signed forms as well as all other reports required will be submitted to the appropriate DMRE regional office within 30 days following the end of each quarter. If the results of any KPDES discharge monitoring data collection indicate noncompliance with a permit condition, then the permittee shall promptly notify the cabinet and shall take immediate corrective actions to return the operations to compliance with all permit conditions. Specialized requirements for compliance with KPDES regulations (e.g. alternate rainfall sampling requirements and limitations, special noncompliance notifications, signatories requirements, testing procedures, recording of results, records of retention, management requirements, other responsibilities, etc.) will be as specified in the KPDES permit issued for the discharge.

Water quality monitoring locations will be at basin outfalls. Results will be submitted to USACE as part of stream monitoring reports.

12. Monitoring reports will include a discussion of inspection findings. Conditions such as bank erosion, streambed characteristics and vegetation survival will be documented. Stream assessments will be conducted and RBP scores will be compared to pre-disturbance scores

and previous monitoring scores to determine if mitigation is progressing towards meeting goals. Any problems will be identified and remedial action taken.

- 13. Parties responsible for monitoring will be Armstrong personnel familiar with the project and natural channel design, or USACE-approved consultants.
- 14. RBP assessments will be used to assess physical quality of stream and will include conductivity, pH and temperature readings. Monitoring reports will include photographic documentation of streams and riparian vegetation. In addition, riparian vegetation will be inspected and density, survivorship, composition, percent cover and any non-native species will be documented. Macroinvertebrate and fish surveys will be conducted, as required. The Kentucky Division of Water's "Methods for Sampling Benthic Macroinvertebrates Communities in Wadeable Waters" will be followed.
- 15. When petitioning the Corps for release of mitigation requirements, a full stream delineation for the mitigation site will be provided (e.g. linear footage, Rosgen, RBP, flow regimes, riffle/pool count, riparian vegetation survivability).
- 16. With the first annual report, as-built drawings for the constructed stream mitigation, watershed drainage area, and reclaimed geomorphological landscape will be provided.
- 17. Data collected at the permanent monitoring stations shall, at a minimum, include Rosgen analysis and RBP characterization/habitat measurements. Data will be recorded on appropriate documents.
- 18. Annual macroinvertebrate and fish sampling will commence the first full year after construction.

(6) Project Success

The applicant will be responsible for all mitigation including construction oversight, monitoring and reports, corrective measures, site access control and protection. The surface mining operation will obtain and submit to KDMP a certification from a registered professional engineer that all mitigation work has been completed in accordance with the conditions of the Water Quality Certification.

(7) Site Protection

Site protection will be provided through use of a restrictive covenant. The restrictive covenant will be executed after completion of the mitigation construction. It will be recorded within 60 days after mitigation construction completion, with USACE notification of recording at the time of execution. Durable signs will be placed identifying all mitigation sites as areas not to be disturbed. They will be placed on approximately 500 foot intervals along streams and along the

perimeter of the wetland. The mitigation sites will be integrated into the reclamation plan, with limited site access.

(8) Contingency Plan

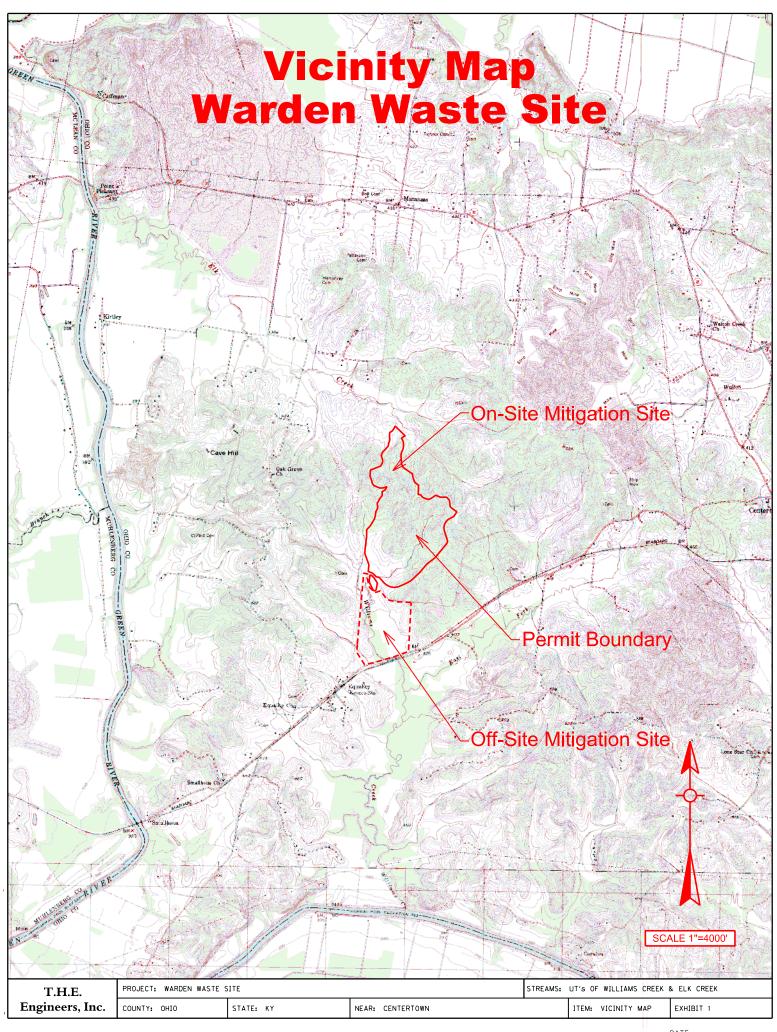
If success criteria are not met for any portion of the monitoring year and/or final success criteria are not satisfied, an analysis of the contributing conditions will be conducted and documented. Remedial action, if required by USACE, will be performed and documented by the applicant. Should these efforts not resolve the problem, the contingency plan for proposed ephemeral and intermittent streams will be payment of in-lieu fees. For intermittent streams, contingency payment will be based on the length of stream that does not support intermittent hydrology during the monitoring period. For ephemeral streams it is based on the length of channel that does not meet performance standards.

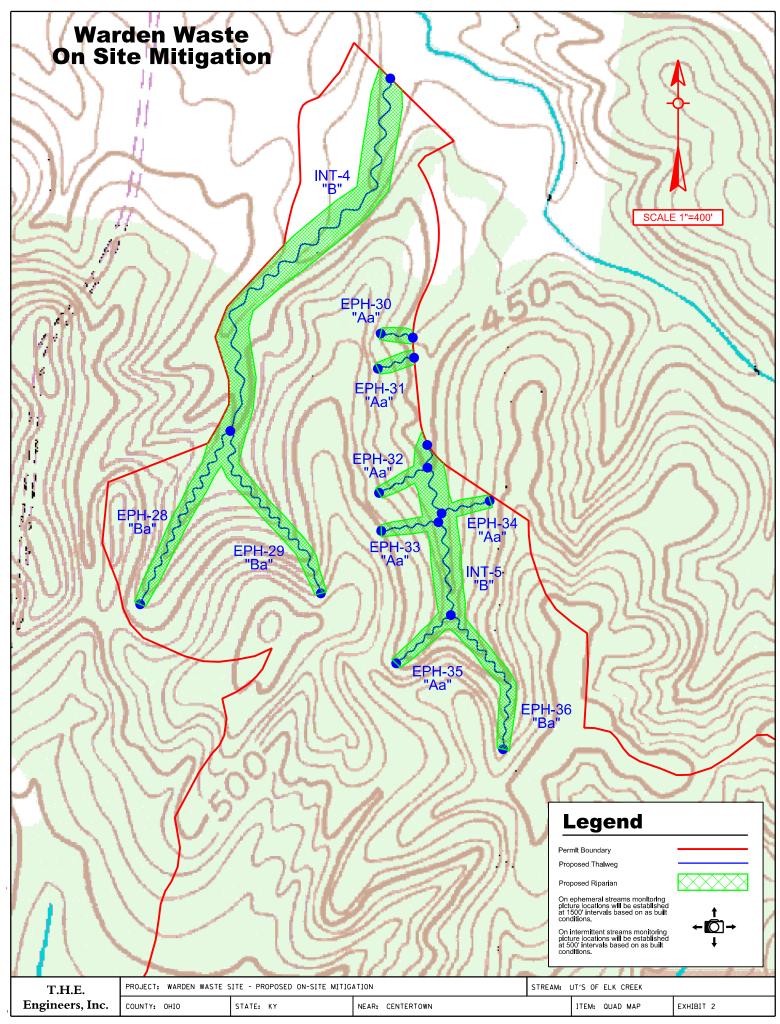
(9) Monitoring and Long-Term Management

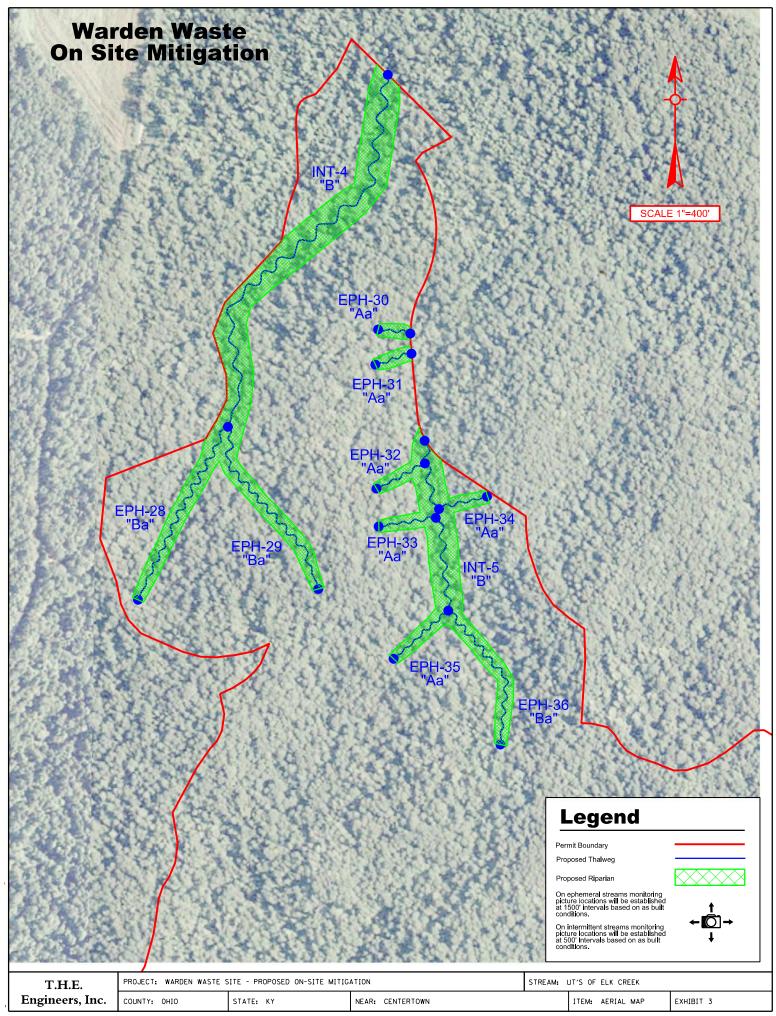
- (a) The applicant will be responsible for accomplishing, maintaining, and monitoring all mitigation sites. Long-term management will include a protective covenant.
 - (b) Monitoring plans will be provided as discussed under Performance Standards.

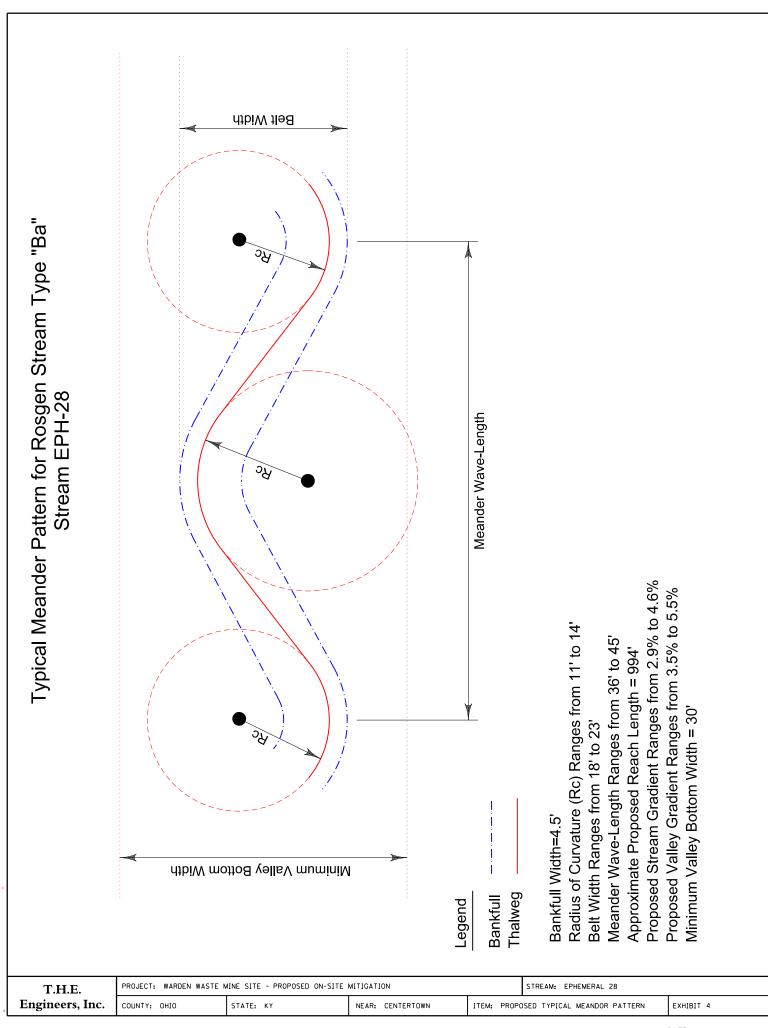
(10) Financial Assurances

The applicant will be responsible for managing any financial assurances and contingency funds set-aside for remedial measures. The USACE, Louisville District, currently does not have the means to handle financial assurances; therefore, no USACE-managed financial assurances are proposed for this project.

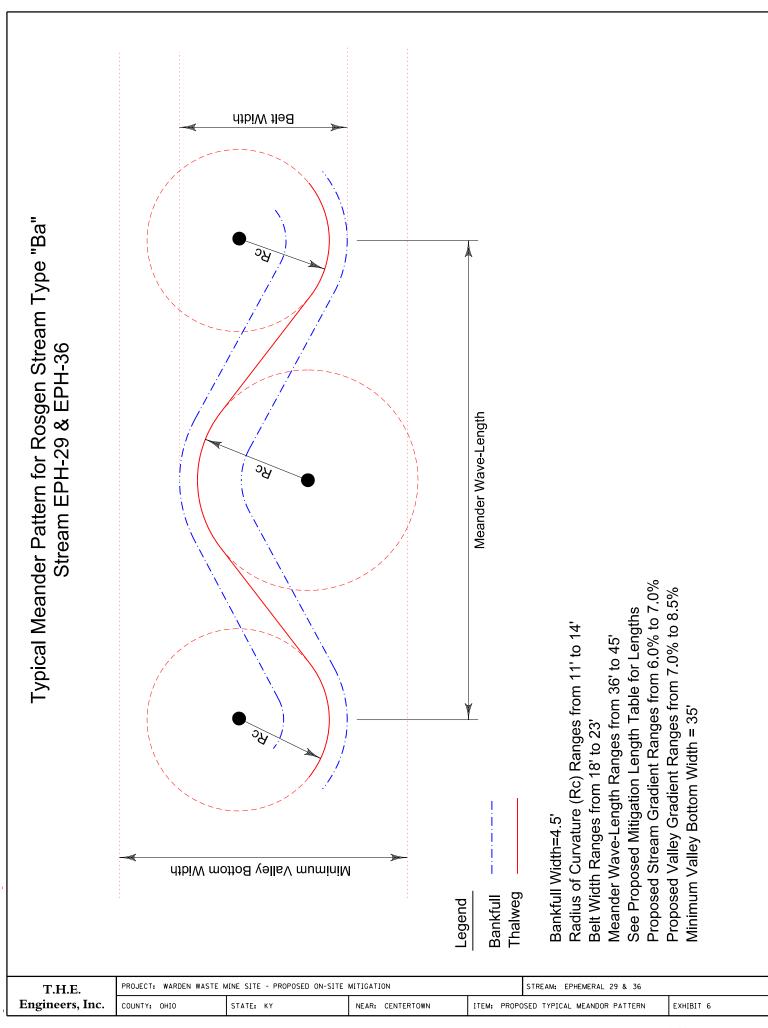








vegetation establishment along stream banks and of each will be used to prevent erosion and assist throughout the riparian zone. Straw mulch will be * E.C.B. 1, E.C.B. 2, straw mulch or a combination crimped, tacked, or held in place with a biodegradable net, as needed. Proposed Channel Dimensions Entrenchment Ratio 2.2 max Bench Width= 1.5' max BF mean D=0.36' BF max D = 0.45FPW= max 10' BFA=1.53SF W/D=12.5 BFW=4.5' Compacted Soil And Rock Mix 5' Minimally Typical Riffle Cross Section Stream EPH-28 -10' ----Tree Row Spacing Rosgen Stream Type "Ba" Seed Through Riparian Zone 25' Minimum Scale: 1"=10' Seed Through Riparian Zone 25' Minimum North American Green C125 BN or equivalent shall be used. North American Green S150 BN or equivalent shall be used. — 10'— Tree Row Spacing EROSION CONTROL BLANKET (may be used as needed) Stitching: Biodegradable thread on 1.5 inch centers. Stitching:Biodegradable thread on 1.5 inch centers. E.C.B. 2 shall meet the following specifications: E.C.B. I shall meet the following specifications: * Netting:100% Biodegradable, natural fiber. 5' Minimally Compacted Soil And Rock Mix — 10'— Tree Row Spacing * Netting:Biodegradable, natural fiber. Matrix Material:100% coconut fiber. is based on bare root seedlings. Shear stress:1.855 lbs. / SQ. FT. Tree spacing shown (10' x 10') Shear stress: 2.35 lbs / SQ. FT. See mitigation plan for other Velocity:10 feet per second. Matrix Material:100% straw. Longevity:up to 24 months. * Longevity:up to 12 months. Velocity:6 feet per second. tree planting options. Note PROJECT: WARDEN WASTE MINE SITE - PROPOSED ON-SITE MITIGATION STREAM: EPHEMERAL 28 T.H.E. Engineers, Inc. COUNTY: OHIO STATE: KY NEAR: CENTERTOWN ITEM: PROPOSED TYPICAL RIFFLE CROSS SECTION EXHIBIT 5 DATE:



E.C.B. I shall meet the following specifications:

T.H.E. Engineers, Inc.

- * Netting:Biodegradable, natural fiber.
 - Matrix Material:100% coconut fiber.
- Stitching: Biodegradable thread on 1.5 inch centers.
 - Shear stress: 2.35 lbs / SQ. FT.
 - Velocity 10 feet per second.
 - Longevity up to 24 months.

PROJECT:

COUNTY: OHIO

North American Green C125 BN or equivalent shall be used.

E.C.B. 2 shall meet the following specifications:

- * Netting:100% Biodegradable, natural fiber.
 - Matrix Material 100% straw.
- Stitching: Biodegradable thread on 1.5 inch centers.
 - Shear stress:1.855 lbs. / SQ. FT.
 - Velocity:6 feet per second.
 - Longevity up to 12 months.

WARDEN WASTE MINE SITE - PROPOSED ON-SITE MITIGATION

NEAR: CENTERTOWN

STATE: KY

North American Green S150 BN or equivalent shall be used.

vegetation establishment along stream banks and of each will be used to prevent erosion and assist throughout the riparian zone. Straw mulch will be crimped, tacked, or held in place with a biodegradable net, as needed.

* E.C.B. 1, E.C.B. 2, straw mulch or a combination

Proposed Channel Dimensions

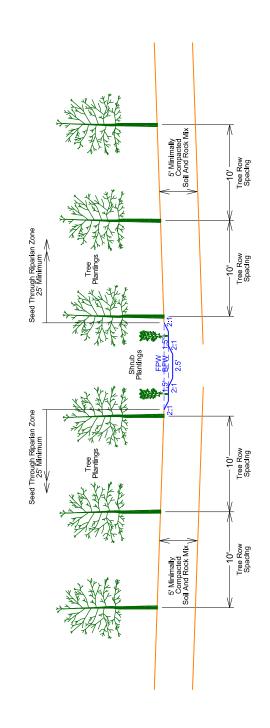
BFW=4.5'

BFA=1.53SF

BF mean D=0.36'

BF max D = 0.45

FPW= max 10' W/D=12.5 Entrenchment Ratio 2.2 max Bench Width= 1.5' max



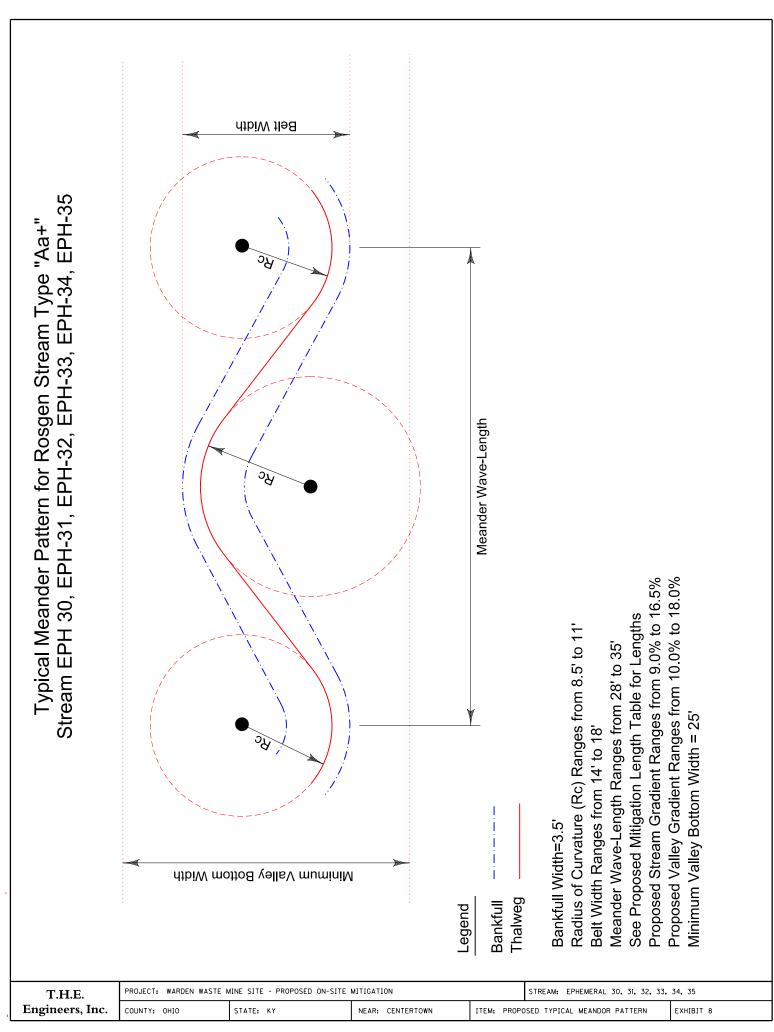
Note

STREAM: EPHEMERAL 29 & 36

ITEM: PROPOSED TYPICAL RIFFLE CROSS SECTION

is based on bare root seedlings. Tree spacing shown (10' x 10') See mitigation plan for other tree planting options.

Typical Riffle Cross Section Stream EPH-29 & EPH-36 Rosgen Stream Type "Ba" Scale: 1"=10'



E.C.B. I shall meet the following specifications:

Engineers, Inc.

* Netting:Biodegradable, natural fiber.

Matrix Material: 100% coconut fiber. T.H.E.

Stitching: Biodegradable thread on 1.5 inch centers.

Shear stress: 2.35 lbs / SQ. FT.

Velocity:10 feet per second.

Longevity:up to 24 months.

COUNTY: OHIO

North American Green C125 BN or equivalent shall be used.

E.C.B. 2 shall meet the following specifications:

* Netting:100% Biodegradable, natural fiber.

Matrix Material: 100% straw.

Stitching: Biodegradable thread on 1.5 inch centers.

Shear stress: 1.855 lbs. / SQ. FT.

Velocity:6 feet per second.

PROJECT: WARDEN WASTE MINE SITE - PROPOSED ON-SITE MITIGATION

NEAR: CENTERTOWN

STATE: KY

* Longevity:up to 12 months.

North American Green S150 BN or equivalent shall be used.

Proposed Channel Dimensions BFW=3.5'

vegetation establishment along stream banks and of each will be used to prevent erosion and assist

* E.C.B. 1, E.C.B. 2, straw mulch or a combination

throughout the riparian zone. Straw mulch will be

crimped, tacked, or held in place with a

biodegradable net, as needed.

BFA=1.0SF

BF mean D=0.29'

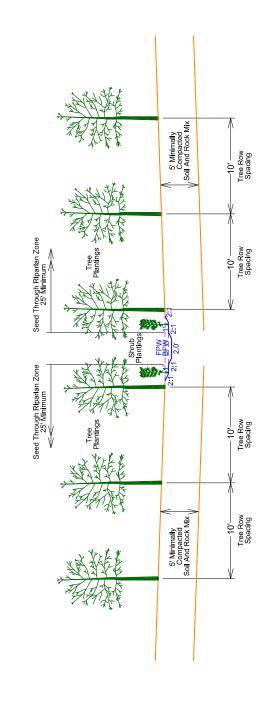
BF max D = 0.35

FPW= max 7.0'

W/D=12.1

Entrenchment Ratio (1.4 to 2.2)

Bench Width= 1.0' max



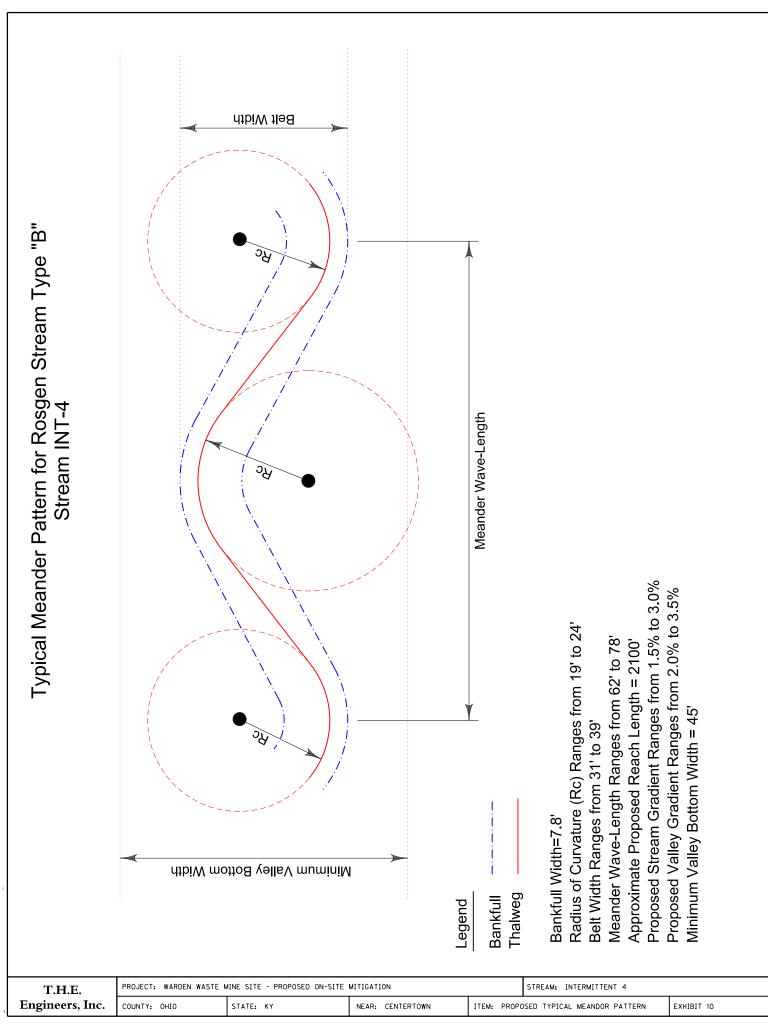
Note

STREAM: EPHEMERAL 30, 31, 32, 33, 34, 35

ITEM: PROPOSED TYPICAL RIFFLE CROSS SECTION

is based on bare root seedlings. * Tree spacing shown (10' x 10') See mitigation plan for other tree planting options.

Typical Riffle Cross Section Stream EPH-30, EPH-31, EPH-32, EPH-33, EPH-34, EPH-35 Rosgen Stream Type "Aa+" Scale: 1"=10'



E.C.B. I shall meet the following specifications:

* Netting:Biodegradable, natural fiber.

T.H.E.

Engineers, Inc.

Stitching: Biodegradable thread on 1.5 inch centers. Matrix Material 100% coconut fiber

Shear stress: 2.35 lbs / SQ. FT.

Velocity:10 feet per second.

PROJECT:

COUNTY: OHIO

* North American Green C125 BN or equivalent shall be used. * Longevity:up to 24 months.

E.C.B. 2 shall meet the following specifications:

* Netting:100% Biodegradable, natural fiber.

Matrix Material: 100% straw.

Stitching:Biodegradable thread on 1.5 inch centers.

Shear stress 1.855 lbs. / SQ. FT.

Velocity:6 feet per second.

* Longevity:up to 12 months.

WARDEN WASTE MINE SITE - PROPOSED ON-SITE MITIGATION

NEAR: CENTERTOWN

STATE: KY

North American Green S150 BN or equivalent shall be used.

vegetation establishment along stream banks and of each will be used to prevent erosion and assist throughout the riparian zone. Straw mulch will be crimped, tacked, or held in place with a biodegradable net, as needed.

* E.C.B. 1, E.C.B. 2, straw mulch or a combination

Proposed Channel Dimensions

BFW=7.8'

BFA=4.3SF

BF mean D=0.55'

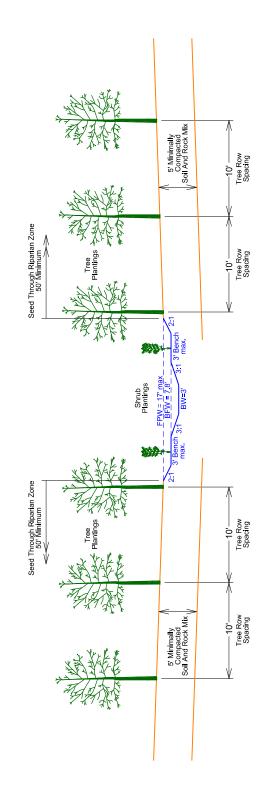
BF max D = 0.8'

FPW= max 17.0'

W/D=14.1

Entrenchment Ratio (1.4 to 2.2)

Bench Width= 3.0' max



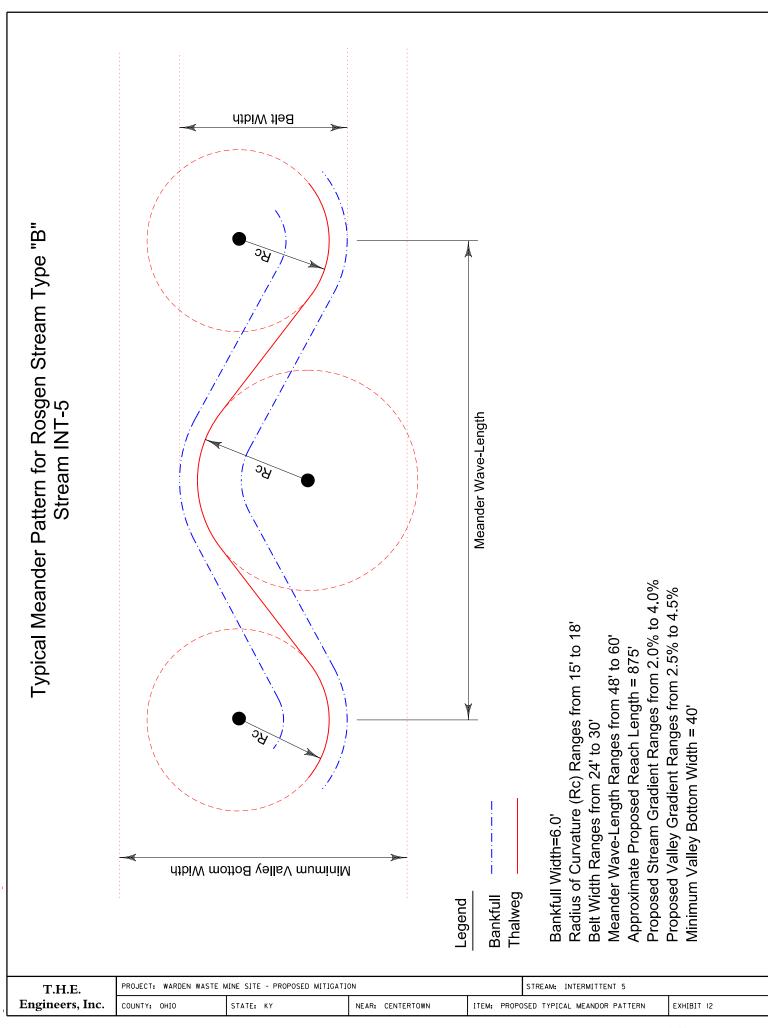
Note

STREAM: INTERMITTENT 4

PROPOSED TYPICAL RIFFLE CROSS SECTION

is based on bare root seedlings. * Tree spacing shown (10' x 10') See mitigation plan for other tree planting options.

Typical Riffle Cross Section Stream INT-4 Rosgen Stream Type "B" Scale: 1"=10'



E.C.B. I shall meet the following specifications:

T.H.E. Engineers, Inc.

* Netting:Biodegradable, natural fiber.

vegetation establishment along stream banks and of each will be used to prevent erosion and assist * E.C.B. 1, E.C.B. 2, straw mulch or a combination

throughout the riparian zone. Straw mulch will be

crimped, tacked, or held in place with a

biodegradable net, as needed.

- Matrix Material:100% coconut fiber.
- Stitching: Biodegradable thread on 1.5 inch centers.
 - Shear stress: 2.35 lbs / SQ. FT.
 - Velocity:10 feet per second.

PROJECT:

COUNTY: OHIO

- * Longevity:up to 24 months.
- North American Green C125 BN or equivalent shall be used.

E.C.B. 2 shall meet the following specifications:

- Netting:100% Biodegradable, natural fiber.
 - Matrix Material:100% straw.
- Stitching: Biodegradable thread on 1.5 inch centers.
 - Shear stress:1.855 lbs. / SQ. FT.
- Velocity:6 feet per second.
 - * Longevity:up to 12 months.

WARDEN WASTE MINE SITE - PROPOSED ON-SITE MITIGATION

NEAR: CENTERTOWN

STATE: KY

North American Green S150 BN or equivalent shall be used.

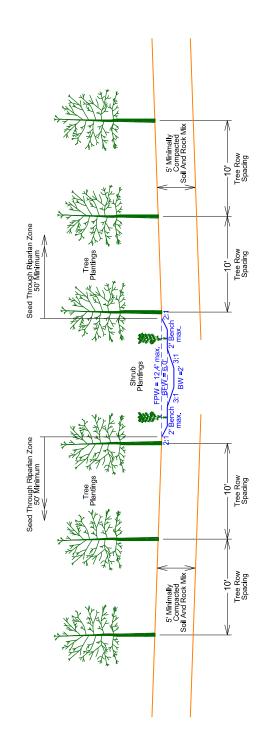
BF mean D=0.45' BFA=2.75SF BFW=6.0

Proposed Channel Dimensions

FPW= max 12.4' max BF max D = 0.68

Entrenchment Ratio (1.4 to 2.2) W/D=13.45

Bench Width= 2.0' max



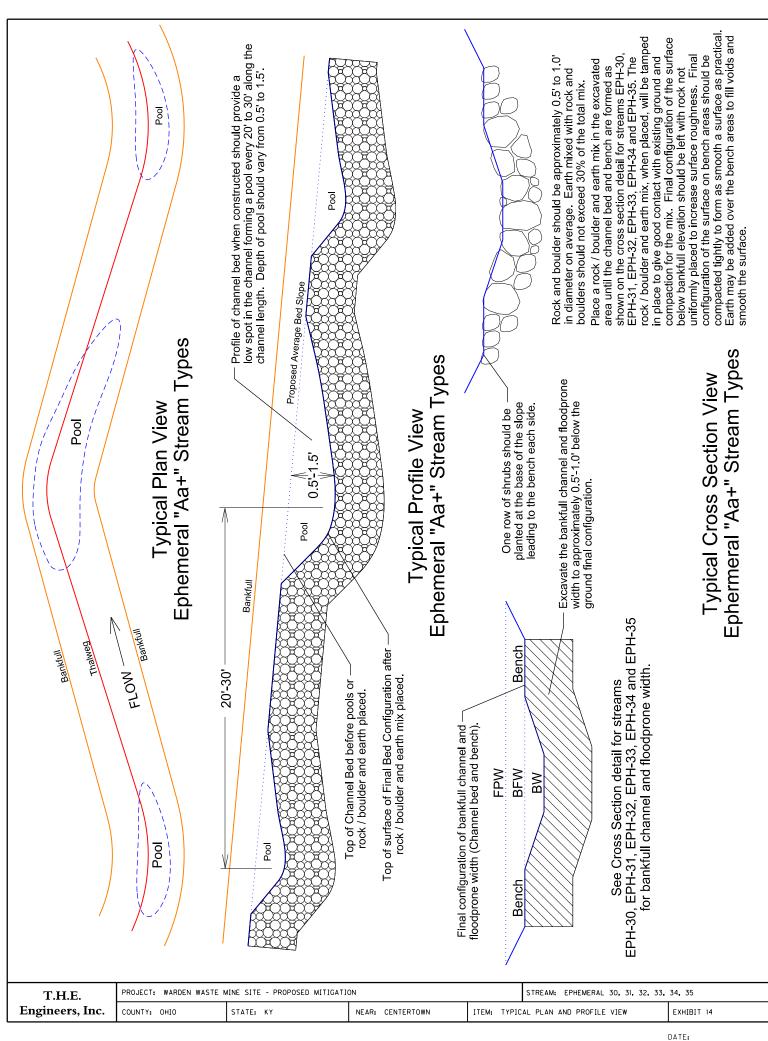
Note

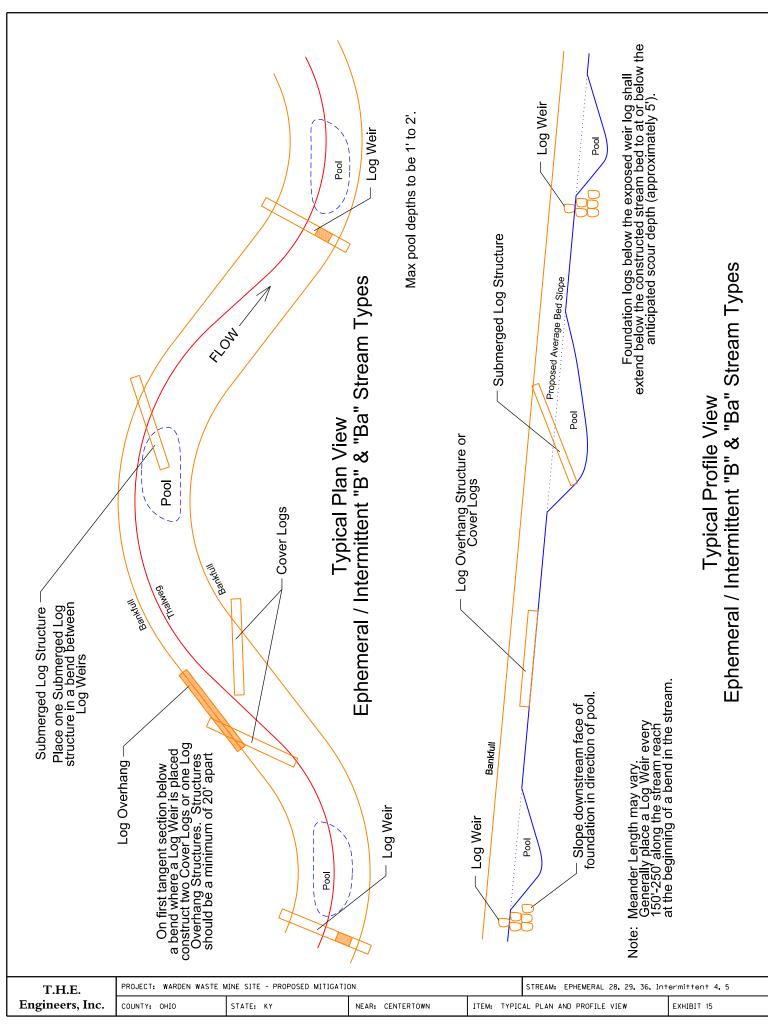
STREAM: INTERMITTENT 5

PROPOSED TYPICAL RIFFLE CROSS SECTION

is based on bare root seedlings. * Tree spacing shown (10' x 10') See mitigation plan for other tree planting options.

Typical Riffle Cross Section Stream INT-5 Rosgen Stream Type "B" Scale: 1"=10'



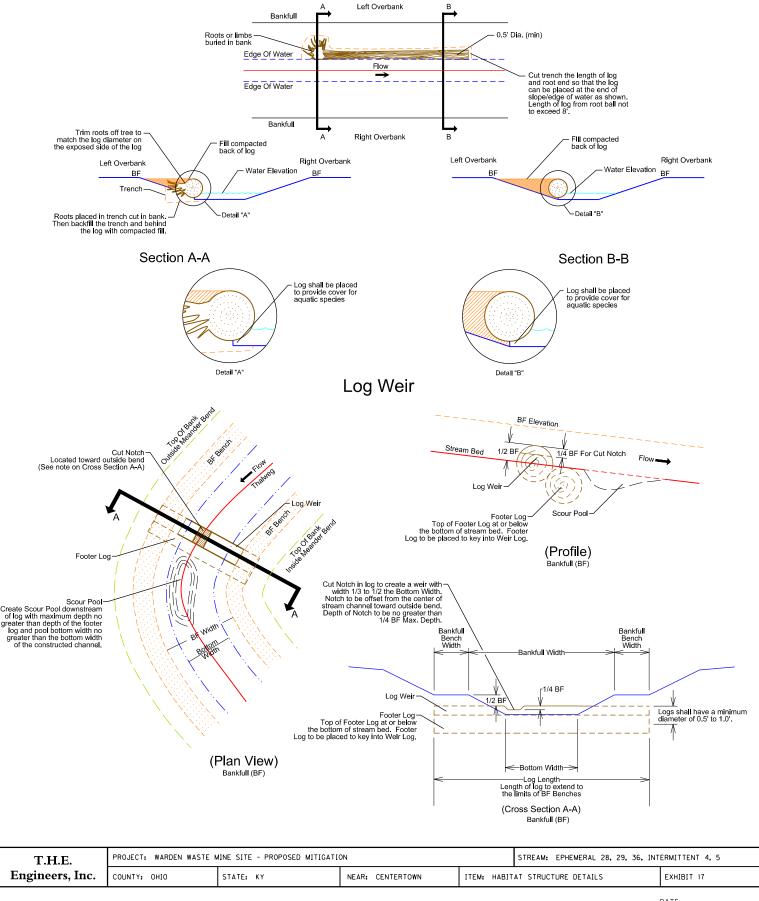


stream bed to at or below the anticipated scour depth (approximately 5'). Foundation rock or logs if substituted shall extend below the constructed Scour Pool Scour Pool Alternate Ephemeral / Intermittent "B" & "Ba" Stream Types Ephemeral / Intermittent "B" & "Ba" Stream Types Scour Pool Scour Pool Low Rock (Weir) Step-Pool Channel Rock Step Structure Typical Section of Rock Step Structure **Typical Profile Typical Plan View** Proposed Average Bed Slope See Double Invert Cross Vane Detail BFW Scour Pool Scour Pool Scour Pool Scour Pool Channel Bottom Channel Bottom slope. These structures will be used on Intermittent or Ephemeral "B" & "Ba" Stream Types. bank full depth and running $\frac{1}{3}$ of the length of the bankfull width. Logs should be buried below the Bankfull Spacing of Rock Step Structures and size of rock Bankfull and a notch cut out to form a weir at least 1/2 the used will be based on channel size and channel so that they are level with the bankfull elevation substituted. Top of the logs need to be placed When rock is not available, logs spanning the Thalweg stream bottom and buried into the banks at Thalweg least 1/2 the bankfull stream width can be stream bottom to prevent scour. downstream of low rock (weir). Pools are to be excavated just Pool depths will vary from FLOW 0.5 foot to 1.0 foot. PROJECT: WARDEN WASTE MINE SITE - PROPOSED MITIGATION STREAM: EPHEMERAL 28, 29, 36, INTERMITTENT 4, 5 T.H.E. Engineers, Inc. STATE: KY NEAR: CENTERTOWN ITEM: TYPICAL PLAN AND PROFILE VIEW EXHIBIT 16 COUNTY: OHIO

Habitat Structure Details

Ephemeral / Intermittent "B" & "Ba" Type Streams

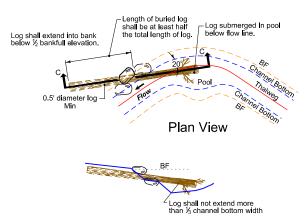




Habitat Structure Details

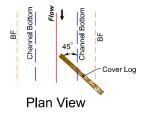
Ephemeral / Intermittent "B" & "Ba" Type Streams

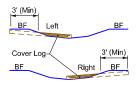
Submerged Log Structure



Section C-C

Cover Log



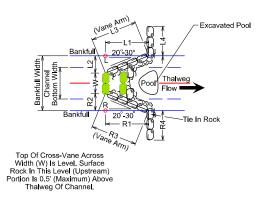


Cross Section View

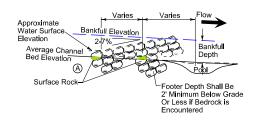
Cover log shall consist of a 0.5' to 1.0' diameter log placed flush on channel bottom. One end of log will extend a minimum of 3.0' into channel bank and other end will extend to ½ to½ channel bottom width. The log shall be angled in upstream direction.

Log will alternate sides. (See Plan Sheets)

Double Invert Cross Vane



(Plan View)



(Profile)

T.H.E.		
Engineers, Inc.		

PROJECT: WARDEN WASTE MINE SITE - PROPOSED MITIGATION

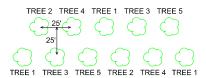
STREAM: EPHEMERAL 28, 29, 36, INTERMITTENT 4, 5

COUNTY: OHIO STATE: KY NEAR: CENTERTOWN ITEM: HABITAT STRUCTURE DETAILS EXHIBIT 18

RIPARIAN ZONE PLANTING NOTES

(USE OPTION ONE OR OPTION TWO FOR TREE PLANTINGS)

PLAN VIEW: PLANTING DETAIL RPM Riparian Trees (Option One)



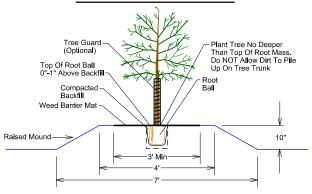
RPM RIPARIAN TREE PLANTINGS (OPTION ONE)

- Only trees that have been produced by the Root Production Method (RPM) shall be planted in the Riparian zone.
- 2. The trees shall be three gallon container grown.
- 3. The trees shall be planted between the dates of October 1 and
- 4. Trees in the same row shall be planted on 25 foot spacing.
- ★5. The first row of trees nearest the channel shall be planted approximately 8 feet beyond the shrub plantings.
- 6. The second row shall be planted 25 feet behind the first row. The subsequent rows will also be on 25 foot spacing.
- 7. The trees shall be planted in a staggered pattern, not one directly
- ★8. The trees shall be planted with alternating species.

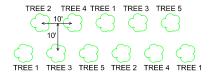
RECOMMENDED PROCEDURES FOR PLANTING RPM TREES

- Site preparation trees are to be planted on a raised mound of existing soil. The mound shall be 8-10 inches high after mild compaction. The base of the mound shall have a minimum width of seven feet with a flat crown (top) at approximately four feet.
- 2. The hole shall be approximately the same size as the container (10 inch diameter-8 inch depth).
- ★3. After unloading trees, they shall be watered thoroughly and protected from excessive heat or cold. Do not allow rootball to freeze or dry out.
- $\bigstar 4.$ If the trees are not to be planted for several days or weeks, they should be watered every 3-4 days and again immediately before planting.
- ★5. Remove the plastic container in which the trees have been growing prior to planting. Do not disturb rootball after container has been removed.
- ★6. Do not plant trees any deeper than the level at which they were growing in the container. It is acceptable to plant the trees 1 inch above the level they were growing in the container.
 - 7. Trees planted between October 1 and December 15, will require the application of a slow release fertilizer after planting. 1-1½ tablespoons around drip zone is recommended. An analysis of 27-3-7 with I.B.D.U. or similar is recommended.

RPM TREE PLANTING DETAIL



PLAN VIEW: PLANTING DETAIL NON - RPM Riparian Trees (Option Two)



TREE PLANTING (OPTION TWO)

- 1. Trees shall be container grown or bare root.
- 2. Bare root stock must be a minimum 30" (Inches) in height and planted on 10' x 10' spacing in a
- 3. Three-gallon trees shall be planted on 19' x 19' spacing in a staggered pattern.
- NOTE: Option One notes with ★ also apply to Option Two

THE FOLLOWING TREES WILL BE USED FOR BOTH OPTIONS

An equal amount of the following trees are to be planted throughout the riparian zone.

INTERMITTENT STREAM TREE LIST

Tree 1: Shellbark hickory (Carya laciniosa)
Tree 2: Cherrybark oak (Quercus pagoda)
Tree 3: Willow oak (Quercus phellos)
Tree 4: Water oak (Quercus nigra)
Tree 5: White oak (Quercus alba)

EPHEMERAL STREAM TREE LIST

Tree 1: Shagbark hickory (Carya glabra)
Tree 2: American beech (Fagus grandifolia)
Tree 3: Shingle oak (Quercus imbricaria)
Tree 4: Post oak (Quercus stellata)
Tree 5: Shumard oak (Quercus shumardii)

SHRUB PLANTINGS (These will not be RPM Plantings)

PLAN VIEW: SHRUB PLANTING DETAIL



The following shrubs are to be planted near bankfull elevation. See typical cross sections for number of rows and placement.

Shrub 1: Rough-leaf Dogwood (<u>Cornus drummondii</u>) Shrub 2: Strawberry Bush (<u>Euonymus americanus</u>) Shrub 3: Indigo Bush (<u>Amorpha fruiticosa</u>)

Three gallon container shrubs shall be planted on approximate 4' spacing with an equal amount of each species planted in random sequence.

SEEDING:

The following native grasses will be sown along both stream banks and throughout the riparian zone:

Switchgrass (<u>Panicum virgatum</u>)
Virginia Wild Rye (<u>Elymus virginicus</u>)
Rough Barnyard Grass (<u>Echinochloa muricata</u>)
Annual Rye (<u>Lolium perenne</u>)
Big bluestream (<u>Andropogon gerardii</u>)
Forking panic grass/smooth panic grass
(<u>Dichanthelium dichotomum</u>/ <u>dichotomiflorum</u>) 20% 20%

Apply seed at a rate of 20 pounds/acre or as recommended by seed supplier.

Straw mulch or erosion control blanket shall be placed immediately following seeding.

Additional native species may be substituted based on approval of Army Corps of Engineers

Riparian Zone Width will be a minimum of 100' for intermittent streams

Shrub plantings and seeding will be the same for each option.

T.H.E. Engineers, Inc.

COUNTY: OHIO

PROJECT: WARDEN WASTE MINE SITE - PROPOSED ON-SITE MITIGATION STATE: KY

NEAR: CENTERTOWN

ITEM: PLANTING NOTES

Streams To Be Mitigated On Site Warden Waste

Stream	Impact Stream Length (ft)	Proposed Stream Stream Length (ft)
EPH-28	794	994
EPH-29	826	992
EPH-30	156	147
EPH-31	168	174
EPH-32	197	252
EPH-33	219	264
EPH-34	283	228
EPH-35	232	338
EPH-36	654	784
INT-4	1794	2100
INT-5	923	875
	MITIGATION TOTA	ALS: Ephemeral = 4173 ft. Intermittent = 2975 ft.

T.H.E. PROJECT: WARDEN WASTE MINE SITE - PROPOSED MITIGATION STATE: KY NEAR: CENTERTOWN ITEM: STREAM: LENGTHS EXHIBIT 20

C. Compensatory Mitigation: Warden Waste Site

Off-Site Mitigation

(1) Goals and Objectives

Off-site streams with low Rapid Bio-assessment Protocol (RBP) scores will be restored in order to increase their functions and provide an ecological "lift" over existing conditions. Streams with sufficiently high RBP scores are to be preserved. All efforts will serve to provide credit towards on-site impacts. The goal of stream mitigation is to provide in-stream habitat and to construct stable stream systems that convey the bankfull discharge and sediment supplied by the watershed. For the off-site restoration streams, the ecological "lift" will result from addressing bank erosion, installing in-stream habitat structures, and raising the water level to re-establish floodprone areas and promote overbank flooding where streams are currently incised. Streams with RBP scores in the poor and marginal range (i.e., scores from 0 to 100) will be given priority for these opportunities. Preservation of other streams will be based on a current assessment that indicates at least a suboptimal quality score (i.e., an RBP score between 101 and 150). One ephemeral stream (E-37) will be preserved but "plugged" at a downstream point to promote retention of water to aid in the creation of wetlands near existing Wetland E. In addition, several swales near existing and created wetlands will be diked for the same retention purpose. Mitigation for wetland impacts will be done in conjunction with restoration efforts for Williams Creek and its tributaries. Wetland creation will primarily involve expanding existing wetlands by inducing more overbank flooding and by planting for a palustrine forested wetland. Enhanced wetlands will be those existing wetlands that will be preserved and expanded through the creation efforts, and have palustrine forested species planted to replace upland species harvested for use in the stream restoration efforts. The goal will be to have 22 acres of palustrine forested wetland (PFO) through preservation, enhancement, and creation efforts (approximately 4 acres preserved, another 8 acres will be preserved/enhanced, and 10 acres created).

(2) Site Selection

Site selection for those streams to be mitigated off-site was based on the principal of enhancing impaired existing aquatic resources and preserving other resources; all within the same major watershed affected by proposed project impacts. The off-site mitigation will be located immediately adjacent and downstream of the project site. The most practical way to improve existing stream functions and contribute to the aquatic resource needs of the watershed is to enhance and/or preserve existing stream systems and drainage networks that are similar to, or

better than, their existing conditions. The off-site area is also an ideal area for restoration/enhancement/preservation opportunities since the site has never been mined, having more natural channel substrates and groundwater conditions.

(3) Baseline Information

- (a) Wetland mitigation and additional stream mitigation will be performed off-site; focusing on the restoration of perennial streams and preservation of intermittent and ephemeral streams. Wetlands will be created in conjunction with stream mitigation activities and result in expanding the footprint of several of the existing wetlands that are to be preserved/enhanced. Other existing wetland areas are to be preserved in their current state. No excavation or fill work is expected for wetland creation. All resources within the off-site mitigation area were assessed separately from the original baseline assessment work; the resulting data sheets (along with photographic documentation) are included with this section of the mitigation plan as an appendix. The lowest RBP scores found during the investigations were for the two perennial streams P-1 (Williams Creek) and P-2 (a Williams Creek tributary also indicated as the Kronos Tributary). These perennials have multiple assessments due to their lengths, allowing for better identification of the existing conditions on which to base opportunities for enhancement, preservation, or a combination. However, due to the low scores all along their lengths, both P-1 and P-2 warrant full restoration. It should be noted that portions of the downstream reaches of P-1 and P-2 lie outside the mitigation site on state roadway right-of-way and will remain undisturbed and not counted for mitigation credit. All other streams yielded RPB scores in the suboptimal range, with many in the middle of the suboptimal range. Two of the lowest scores were for intermittent I-7 and ephemeral E-42 (108 and 109, respectively). Intermittent I-7 lies mostly within existing roadway right-of-way, eliminating any meaningful opportunity for enhancement or restoration. For purposes of the mitigation plan I-7 will be left undisturbed, with limited preservation credit requested. Although E-42 has a low score, it has valuable as the outlet channel for a wetland and should be preserved. It is proposed that all intermittent and ephemeral streams (within the project area and outside roadway right-of-way limits) be preserved. See Table 1 for the RBP scores for all streams and/or stream reaches found on the mitigation site.
- (b) The proposed off-site mitigation will involve the enhancement of 6,693 feet of perennial stream, as well as the preservation of 3,429 feet of intermittent and 3,848 feet of ephemeral stream. In addition, at least 10 acres of palustrine forest wetlands will be created in conjunction with stream mitigation activities, while approximately 12 acres of existing wetlands will be preserved and/or enhanced. See Table 2 for a list of all project mitigation proposed.

- (c) The aquatic resource type includes ephemeral, intermittent, and perennial streams and forested wetlands.
- (d) Off-site streams and wetlands were evaluated separately. Their assessment sheets/photographs are included with this section of the mitigation plan. The off-site site is located within the same two twelve-digit Hydrologic Unit Codes (HUC's) as the on-site mitigation area; the Elk Creek-Green River (051100030505) and Nelson Creek-Green River (051100030504).

(4) Mitigation Work Plan

- (a) Boundaries of the proposed mitigation site are provided in the exhibits.
- (b)The off-site stream and wetland mitigation work will be performed during the development of the waste disposal to reduce temporal loss.

Off-site stream/wetland construction sequence will be as follows:

- 1. Perform minor excavation of stream banks to establish floodprone widths at bankfull elevations; while limiting disturbance of existing riparian vegetation
- 2. Install bank toe protection where appropriate
- 3. Install in-stream structures, including those to raise water surfaces for wetland creation.
- 4. Prepare streambanks for seeding
- 5. Install erosion control blanket as needed.
- 6. Plant USACE approved trees and shrubs along streams and proposed wetland areas.
- (c) The proposed off-site streams retain their current patterns and connectivity; existing wetlands will remain undisturbed.
- (d) For off-site stream restoration, where needed due to construction, and any of the preserved streams that may have some limited disturbance from the restoration construction activities, the native vegetation to be planted along stream banks and riparian zones include the following species or species available at the time of ordering and approved by USACE (the same species to be utilized for the on-site mitigation effort):

Grasses - Virginia wild rye (*Elymus virginicus*), Switchgrass (*Panicum virgatum*), Rough barnyard grass (*Echinochloa muricata*), Big bluestem (*Andropogon gerardii*), Forking panic grass/smooth panic grass (*Dichanthelium dichotomum/dichotomiflorum*) and Annual rye (*Lolium perenne*).

Shrubs – Rough-leaf dogwood (*Cornus drummondii*), Strawberry bush (*Euonymus americanus*), and Indigo-bush (*Amorpha fruticosa*). Shrubs will be 3-gallon container grown, planted on a four foot spacing along the streambanks at the bankfull elevation where needed to aid in bank stabilization.

Trees – For the perennial streams and any intermittent stream that may require some replanting: Shellbark hickory (*Carya laciniosa*), Willow oak (*Quercus phellos*), Cherrybark oak (*Quercus pagoda*), Water oak (*Quercus nigra*), and White oak (*Quercus alba*). For any ephemeral stream that may require some replanting: Shagbark hickory (*Carya glabra*), American beech (*Fagus grandifolia*), Shingle oak (*Quercus imbricaria*), Post oak (*Quercus stellata*), and Shumard oak (*Quercus shumardii*). Trees will be either 3-gallon container grown RPM planted at a rate of 60 trees per acre, or 3-gallon non-RPM planted at a rate of 120 trees per acre, or non-RPM bare root seedlings (minimum of 30 inches in height) planted at a rate of 450 stems per acre. The option utilized will be dependent on plant availability at the time of mitigation planting (if plant availability is not an issue, more than one option may be utilized to compare survival rates for future mitigation projects). In addition, a single row of shrubs will be planted along edge of stream just above bankfull elevation where needed to aid in bank stabilization. Shrub spacing will be approximately four feet on average with higher densities at high shear locations (ex. outside bends).

For off-site wetland creation the native vegetation to be planted for establishing at least 10 additional acres of palustrine forested wetland include the following species (wetland enhancement areas will use the same species as well):

Trees – Shellbark hickory (*Carya laciniosa*), Pin oak (*Quercus palustris*), Cherrybark oak (*Quercus pagoda*), Swamp white oak (*Quercus bicolor*), Willow oak (*Quercus phellos*), and Baldcypress (*Taxodium distichum*).

Herbaceous seed mix – a mix, such as Cardno JFNew's "Wooded Wetland Establishment" is suggested. As an alternative, the following species list shall be used (other appropriate species may be substituted as cost and availability allows and as approved by the USACE): Green bulrush (*Scirpus atrovirens*), Virginia wild rye (*Elymus virginicus*), Fox sedge (*Carex vulpinoidea*), Soft rush (*Juncus effusus*), Woolgrass (*Scirpus cyperinus*), and Common sneezeweed (*Helenium autumnate*).

Per Kentucky Division of Mine Permits (KDMP) requirements: planting of woody species will occur during first dormant season following stream restoration.

- (e) Any vegetation that would hinder planting or provide excessive competition to natural regeneration of planted species will be removed with appropriate treatment and documented in each annual monitoring report.
- (f) Exotic vegetation control: The following efforts will be made to reduce introduction and dispersal of invasive species: removal of exotic species before mitigation begins, cleaning equipment before it reaches the site, inspecting labels on seed mixtures and mulch for composition and vegetative monitoring during the required monitoring period. Volunteers,

invasives, and/or exotic vegetation along riparian zones or within created wetland areas will be removed by mowing, digging, spraying, burning or a combination of these during annual maintenance; and documented in each annual monitoring report.

- (g) Proposed mitigation plan sheets provide elevation and slope details for the restored stream designs, and details on specific enhancement efforts and wetland creation.
- (h) Erosion control methods will consist of the following: enhancing stream channels during low or no flow periods, applying seed and installing erosion control blanket immediately after final grading, planting trees and shrubs and installing silt fence as needed. Stream enhancement will proceed in a downstream direction to avoid re-suspension of sediment.
- (i) Proposed stream enhancement designs are based on geomorphic and hydrologic principles incorporated with natural channel design techniques utilizing in-stream structures for habitat diversity and stream bank protection. Wetland creation designs will be incorporated into stream enhancement designs.
- (j) Proposed Stream Plans will indicate stream type, pattern, profile and dimensions for each stream. Stream morphology was determined by using regional curve data, collecting and studying data from the existing streams, sediment transport and hydrologic calculations, and experience designing and constructing streams.
- (k) Natural channel design methods, in-stream structures, and habitat enhancement features will be incorporated into the mitigation plan. Habitat enhancement features will consist of cover logs, log overhangs, submerged logs, and log/rock vane structures. These features will also provide bank stability while vegetation becomes established. Stream enhancement efforts will also include the installation of grade control structures to raise incised streambeds in order to promote reconnection to the floodplain. This effort will also allow for establishment of wetlands in the floodplain of those streams.
- (I) Mitigation sites will be permanently protected and maintenance will be provided as needed, throughout the monitoring period. Site protection will be provided through use of a restrictive covenant. Maintenance will include elimination of volunteer species by use of general or spot applications of herbicides, hand picking and mowing, where appropriate.
- (m) A representative from the design team will be on site during critical phases of the construction process. The representative will make periodic site visits and will familiarize construction personnel with design plans and restoration methods.

(5) Performance Standards/Success Criteria

(a) Standards for assessing **stream restoration mitigation** goals include:

- 1. Streams to be restored on-site must be constructed to meet the dimension, pattern and profile of the indicated Rosgen Stream Type.
- 2. There should be no signs of excessive stream bank erosion or severe headcutting.
- 3. At the end of the monitoring period, the streams shall have average riffle cross section dimensions reflective of the indicated Rosgen Stream Type.
- 4. At the end of the monitoring period, the restored off-site streams shall have minimum EPA Rapid Bioassessment Protocol scores in the sub-optimal range. The target RBP scores are as follows: P-1 (upstream to downstream by assessment reach) = 110, 110, 120, 120; and P-2 = 120.
- 5. Root Production Method (RPM) trees will be planted at a rate of 60 trees per acre, or non-RPM 3-gallon container grown will be planted at a rate of 120 trees per acre, or bare root seedlings (minimum height of 30 inches) will be planted at a rate of 450 trees per acre. The option utilized will be dependent on plant availability at the time of mitigation planting (if plant availability is not an issue, more than one option may be utilized to compare survival rates for future mitigation projects).
- 6. Riparian vegetation shall have at least an 80% survival rate of the initial planting of non-RPM 3-gallon container grown or bare root seedlings; with no single planted tree species constituting more than 25 percent of the surviving species. The survival rate for RPM plantings is 90 percent. No one species shall comprise more than 25 percent of the surviving RPM plantings.
- 7. Riparian vegetation will consist of no volunteer tree species at the end of the monitoring period.
- 8. Per Kentucky Division of Mine Permits (KDMP) requirements: one measure of project success will be final stream assessment scores that equal or exceed pre-project scores.
- 9. In the riparian areas, herbaceous plantings must provide a minimum of 70 percent ground cover; with no one species accounting for more than 40 percent ground cover.
- 10. Streams will retain their existing linear footage and flow regime.
- 11. Streams will have a new Ordinary High Water Mark for sections resulting from constructed riffle structures.
- 12. Stream channel and in-stream structures must be stable and functioning as designed.
- 13. Stream morphology must meet proposed Rogsen classifications (i.e., stream slope, sinuosity, belt width, meanders, bankfull cross-sectional area, width/depth ratios).
- 14. Annual monitoring should indicate that mitigation is progressing toward meeting success criteria.

- (a) Standards for assessing wetland creation mitigation goals include:
- 1. Success will be based on the USACE 2009 Draft Interim Regional Supplement to the Corps of Engineers' Wetland Delineation Manual: Eastern Mountains and Piedmont Region.
- 2. Riparian vegetation shall have at least an 80% survival rate of the initial planting of non-RPM 3-gallon container grown or bare root seedlings; with no single planted tree species constituting more than 25 percent of the surviving species. The survival rate for RPM plantings is 90 percent. No one species shall comprise more than 25 percent of the surviving RPM plantings. Herbaceous plantings must provide a minimum of 70 percent ground cover with no one species accounting for more than 40 percent of ground cover.
- 3. The wetland will meet the proposed Cowardin Classification (PFO) at the end of the monitoring period.
- 4. At least 10 acres of created wetlands will develop in order to fully meet mitigation requirements.
- 5. Wetland hydrology will be achieved through the measurement of 14 or more consecutive days of flooding or ponding, or a water table 12 inches or less below the soil surface, during the growing season at a minimum frequency of 5 years in 10, as stated in the USACE Regional Supplement¹.
- 6. Three hydrogeomorphic (HGM) variables will be measured during biannual monitoring to assess the restoration of wetland functions. Water table fluctuation, redoximorphic features, and ground vegetation biomass will be measured per the regional HGM guidebook². These variables will determine the wetland's ability to maintain a characteristic plant community, remove and sequester elements and compounds, and cycle nutrients.

If success criteria are not met during the monitoring period, an analysis of the contributing

(b) Adaptive Management

conditions will be conducted and documented. Remedial action, if required by USACE, will be performed and documented by the applicant. Remedial actions may include replanting trees and shrubs, reseeding grasses, adjusting in-stream structures and repairing eroded banks. These actions will be performed at least twice, depending on the nature of the problem. Should these efforts not resolve the issue, another site will be found to replace failed sections of the mitigation sites. The contingency plan for proposed restored perennial streams and created wetlands will

¹ U.S. Army Corps of Engineers. 2010. Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region, ed. J.S. Wakeley, R.W. Lichvar, and C.V. Noble. ERDC/EL TR-10-XX. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

² Ainslie, W. B., Smith, R. D., Pruitt, B. A., Roberts, T. H., Sparks, E. J., West, L., Godshalk, G. L., and Miller, M. V. (1999). "A regional guidebook for assessing the functions of low gradient, riverine wetlands in western Kentucky," Technical Report WRP-DE-17, U. S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

be payment of in-lieu fees. For the perennial streams, contingency payment will be based on the length of stream that does not meet performance standards/success criteria during the monitoring period. For wetlands, it is based on the acreage of wetland that does not meet performance standards.

(c) Project Performance Evaluations

All stream and wetland sites will be monitored in accordance with the Mitigation Final Rule, 2008. In general, the following guidelines will be used:

For restoration streams:

- 1. The monitoring period must be sufficient to demonstrate that the compensatory mitigation has met performance standards. The monitoring period length shall be a minimum of five years unless performance standards are met in less than five years. In this case, the monitoring period length can be reduced if there are at least two consecutive monitoring reports that demonstrate that performance standards have been met. Longer monitoring timeframes are necessary for compensatory mitigation projects that take longer to develop.
- 2. Biannual inspections will be conducted each year during the first and last month of the growing season.
- 3. The first monitoring report will be due after the first full growing season following the initial planting.
- 4. Monitoring reports are due to USACE by January 31 for the previous year, and to the Kentucky Division of Mine Permits (KDMP) by December 31 for the same monitoring year.
- 5. Photo stations and monitoring stations will be at the same location.
- 6. Permanent photo/monitoring stations will be set at a minimum of 1 per 500 feet of perennial stream.
- 7. The same monitoring stations shall be used every year.
- 8. Personnel familiar with natural stream design principles will perform monitoring tasks.
- 9. Stream monitoring will consist of assessing stream parameters and documenting vegetation survival.
- 10. Stream channel form and in-stream structure stability will be monitored to ensure stream functionality. Maintenance will be performed if the following conditions develop: excessive bank erosion occurs (RBP scores in the marginal range for bank stability), erosion around or under structures that would render them ineffective or cause structure collapse, excessive siltation of pools reducing their effectiveness in reducing energy and/or adversely affecting pool habitat, and upstream directed vertical bed erosion (headcut) that would jeopardize structure stability and lead to unstable channel conditions (RBP scores in marginal range for epifaunal/substrate cover or sediment deposition). Stream conditions will be inspected frequently by design and/or

stream construction team. Stream channel maintenance will be performed as needed to ensure stream stability, function and value.

- 11. Monitoring reports will include a discussion of inspection findings. Conditions such as bank erosion, streambed characteristics and vegetation survival will be documented. Stream assessments will be conducted and RBP scores will be compared to pre-disturbance scores and previous monitoring scores to determine if mitigation is progressing towards meeting goals. Any problems will be identified and remedial action taken.
- 12. Parties responsible for monitoring will be Armstrong personnel familiar with the project and natural channel design, or USACE-approved consultants.
- 13. RBP assessments will be used to assess physical quality of stream and will include conductivity, pH and temperature readings. Monitoring reports will include photographic documentation of streams and riparian vegetation. In addition, riparian vegetation will be inspected and density, survivorship, composition, percent cover and any non-native species will be documented. Macroinvertebrate and fish surveys will be conducted, as required. The Kentucky Division of Water's "Methods for Sampling Benthic Macroinvertebrates Communities in Wadeable Waters" will be followed.
- 14. When petitioning the Corps for release of mitigation requirements, a full stream delineation for the mitigation site will be provided (e.g. linear footage, Rosgen, RBP, flow regimes, riffle/pool count, riparian vegetation survivability).
- 15. With the first annual report, as-built drawings for the enhanced stream mitigation will be provided.
- 16. Data collected at the permanent monitoring stations shall, at a minimum, include Rosgen analysis and RBP characterization/habitat measurements. Data will be recorded on appropriate documents.
- 17. Annual macroinvertebrate and fish sampling will commence the first full year after construction.

For created wetlands:

- 1. The monitoring period must be sufficient to demonstrate that the compensatory mitigation has met success criteria. The monitoring period length shall be 10 years; however, the applicant can petition for early release after 5 years if success is assured.
- 2. Biannual inspections will be conducted each year during the first and last two months of the growing season.
- 3. The first monitoring report will be due after the first full growing season following the initial planting.
- 4. Monitoring reports are due to USACE by January 31 for the previous year.

5. One permanent monitoring/photo station is typically required for every three acres of each wetland type created at each wetland location; in this case there are 4 distinct areas of creation, so a total of 4 photo stations will be used. A Regional Supplement wetland delineation form will be filled out at each station.

(6) Project Success

The applicant will be responsible for all mitigation including construction oversight, monitoring and reports, corrective measures, site access control and protection. The surface mining operation will obtain and submit to KDMP a certification from a registered professional engineer that all mitigation work has been completed in accordance with the conditions of the Water Quality Certification.

(7) Site Protection

Site protection will be provided through use of a restrictive covenant. The restrictive covenant will be executed after completion of the mitigation construction. It will be recorded within 60 days after mitigation construction completion, with USACE notification of recording at the time of execution. Durable signs will be placed identifying the mitigation site as an area not to be disturbed. They will be placed on approximately 500 foot intervals along the perimeter of the site. The mitigation site will be integrated into the reclamation plan, with limited site access.

(8) Contingency Plan

If success criteria are not met for any portion of the monitoring year and/or final success criteria are not satisfied, an analysis of the contributing conditions will be conducted and documented. Remedial action, if required by USACE, will be performed and documented by the applicant. Should these efforts not resolve the problem, the contingency plan for the proposed enhancement of perennial streams and created wetlands will be payment of in-lieu fees. For the perennial streams, contingency payment will be based on the length of stream that does not meet performance standards/success criteria during the monitoring period. For wetlands, it is based on the acreage of wetland that does not meet performance standards.

(9) Monitoring and Long-Term Management

- (a) The applicant will be responsible for accomplishing, maintaining, and monitoring all mitigation sites. Long-term management will include a protective covenant.
 - (b) Monitoring plans will be provided as discussed under Performance Standards.

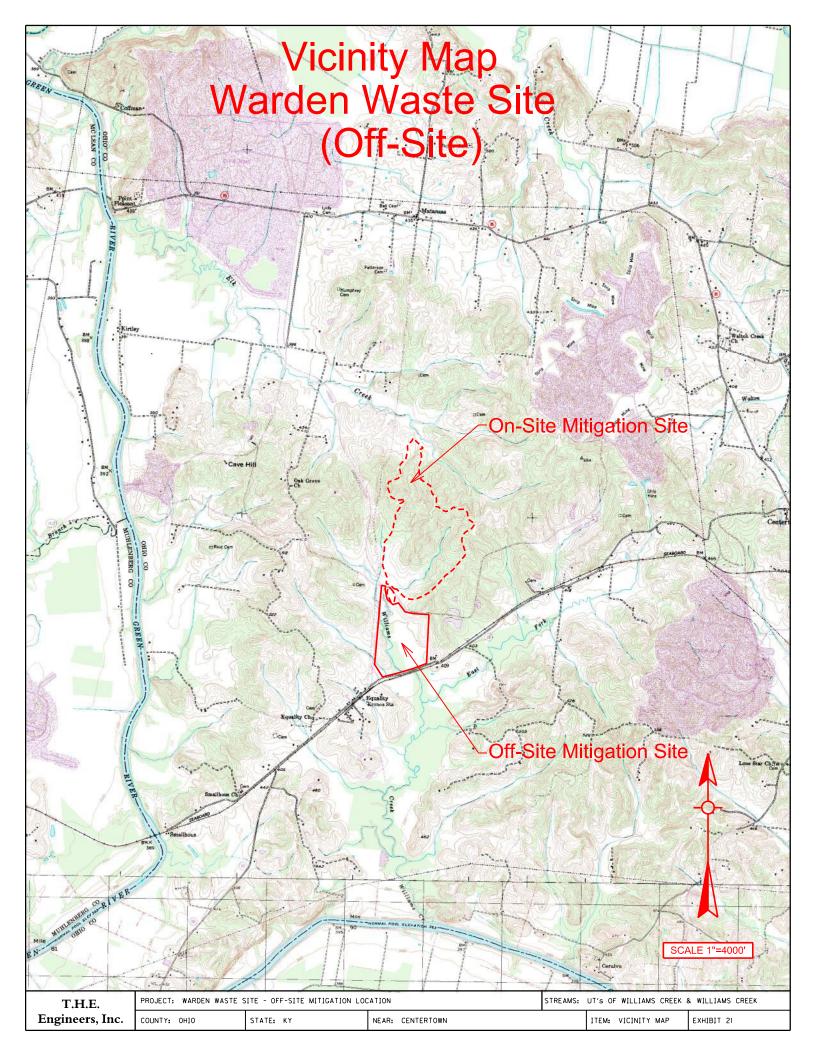
(10) Financial Assurances

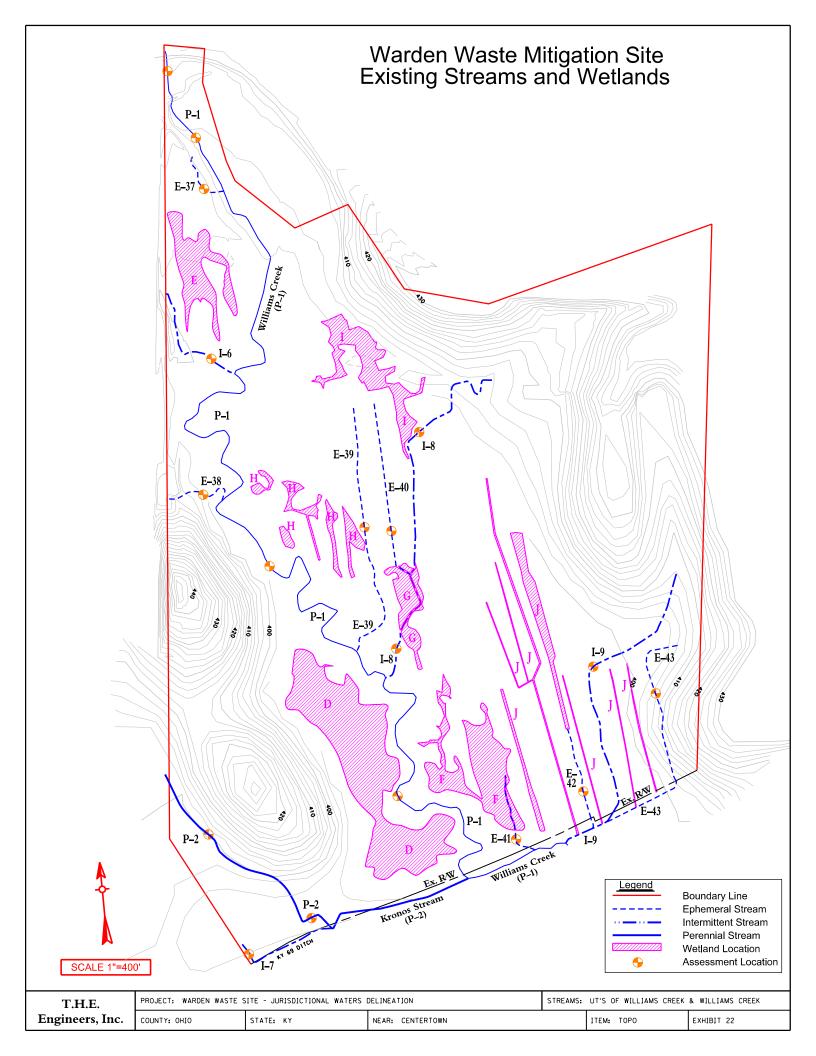
The applicant will be responsible for managing any financial assurances and contingency funds set-aside for remedial measures. The USACE, Louisville District, currently does not have the means to handle financial assurances; therefore, no USACE-managed financial assurances are proposed for this project.

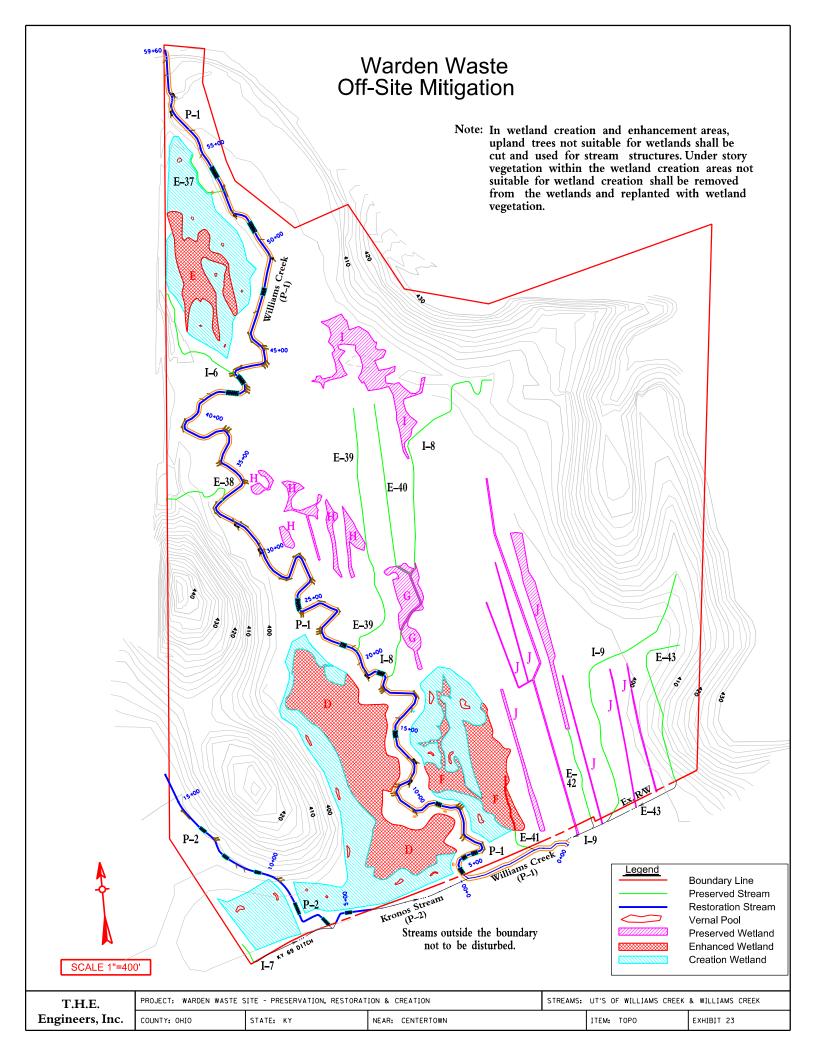
TABLE 1
Warden Waste Site
Existing Off-site Resources

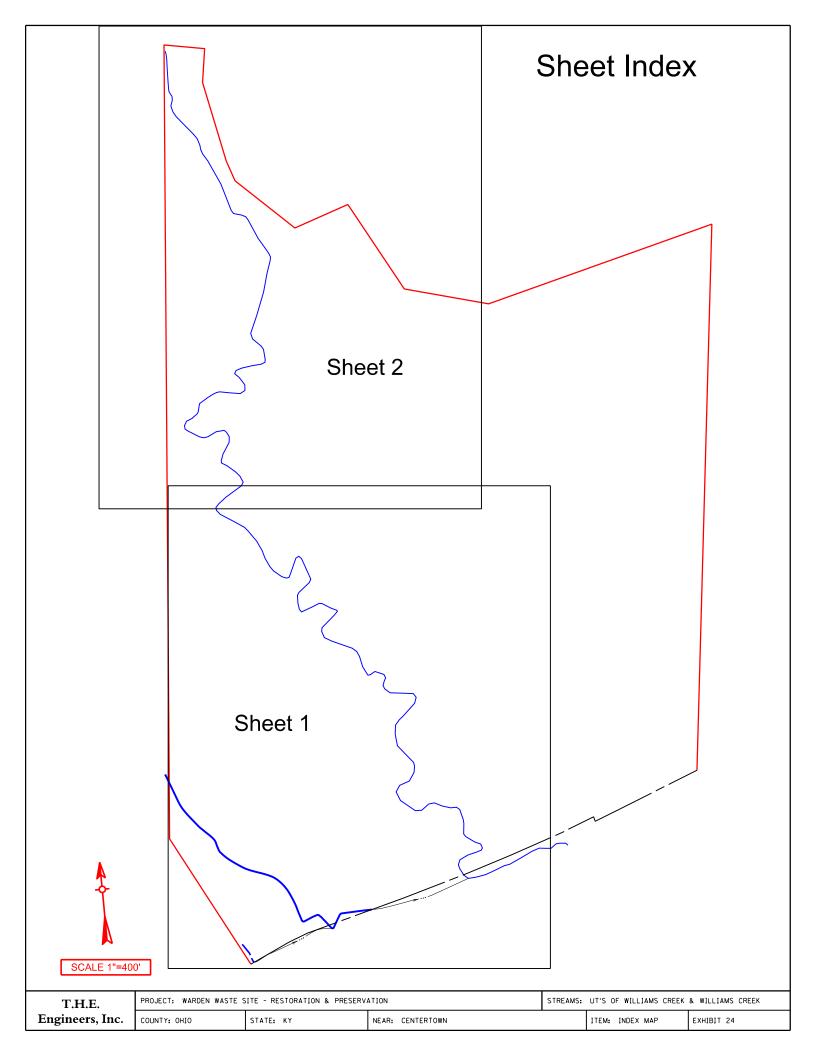
Stream	Stream	Existing	RBP
ID	Type	Length/Acres	Scores*
OFF-SITE	туре	Lengin/Acres	300163
OFF-SITE			
P-1	Perennial	5509	89/97/95/97
P-1 P-2	Perennial	1184	
I-6			95/98 114
	Intermittent	517	
I-7	Intermittent	91	108
I-8	Intermittent	1626	125/121
I-9	Intermittent	1195	123
E-37	Ephemeral	253	132
E-38	Ephemeral	329	117
E-39	Ephemeral	1092	124
E-40	Ephemeral	752	130
E-41	Ephemeral	343	128
E-42	Ephemeral	387	109
E-43	Ephemeral	692	112
Wetland D	PFO	4.84 ac.	
Wetland E	PFO	1.19 ac.	
Wetland F	PFO	1.90 ac.	
Wetland G	PFO	0.68 ac.	
Wetland H	PFO	0.70 ac.	
Wetland I	PFO	1.24 ac.	
Wetland J	PFO	1.15 ac.	
TOTALS:	Perennial	6693 ft.	
	Intermittent	3429 ft.	
	Ephemeral	3848 ft.	
	Wetlands	11.70 ac.	
	1.0	0 0.0.	

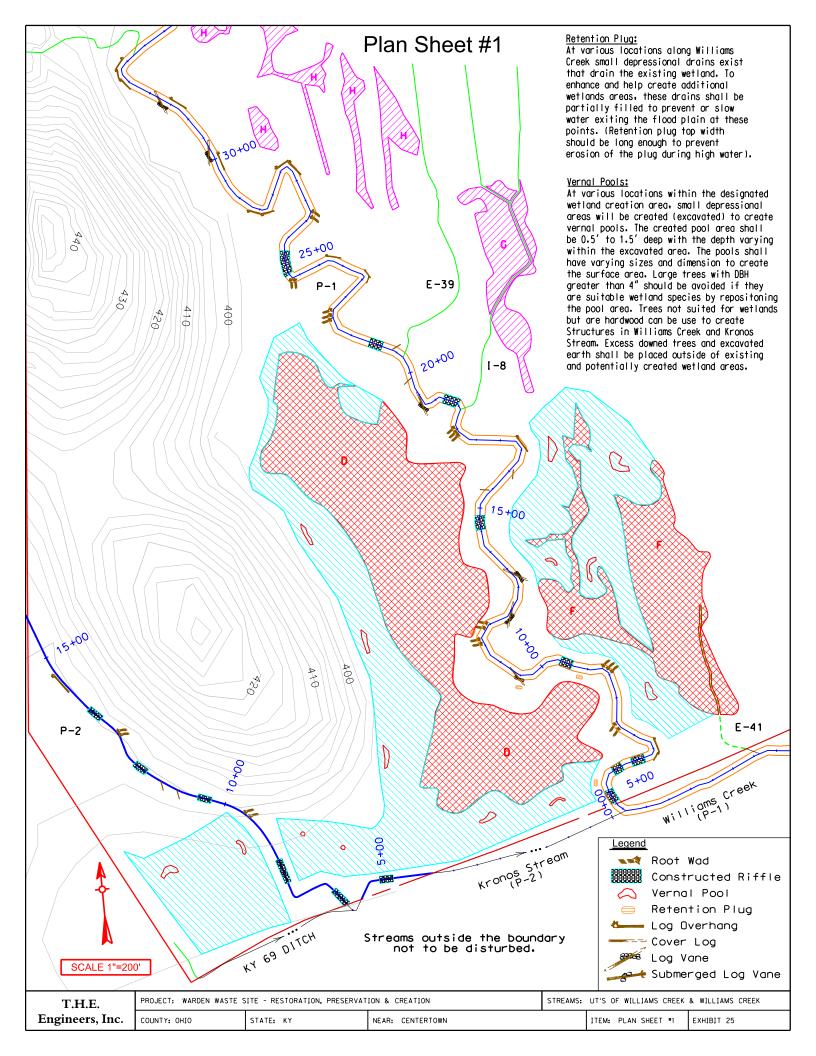
^{*}Listed upstream to downstream for multiple assessments

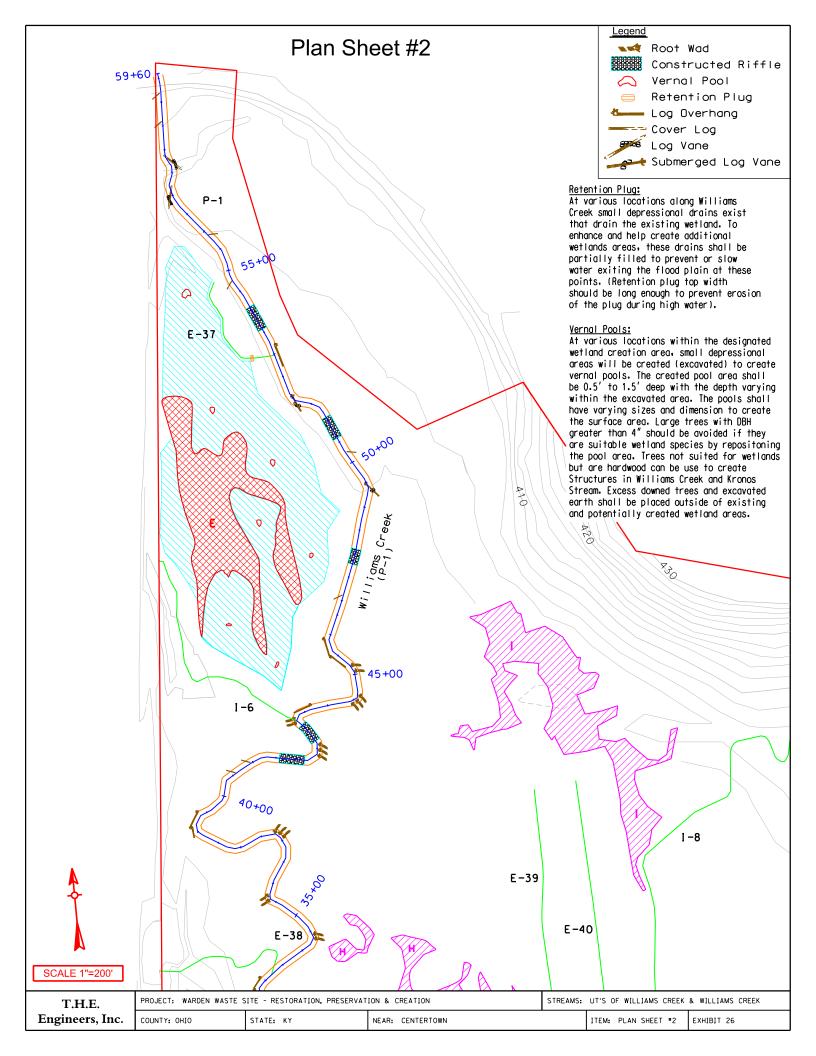


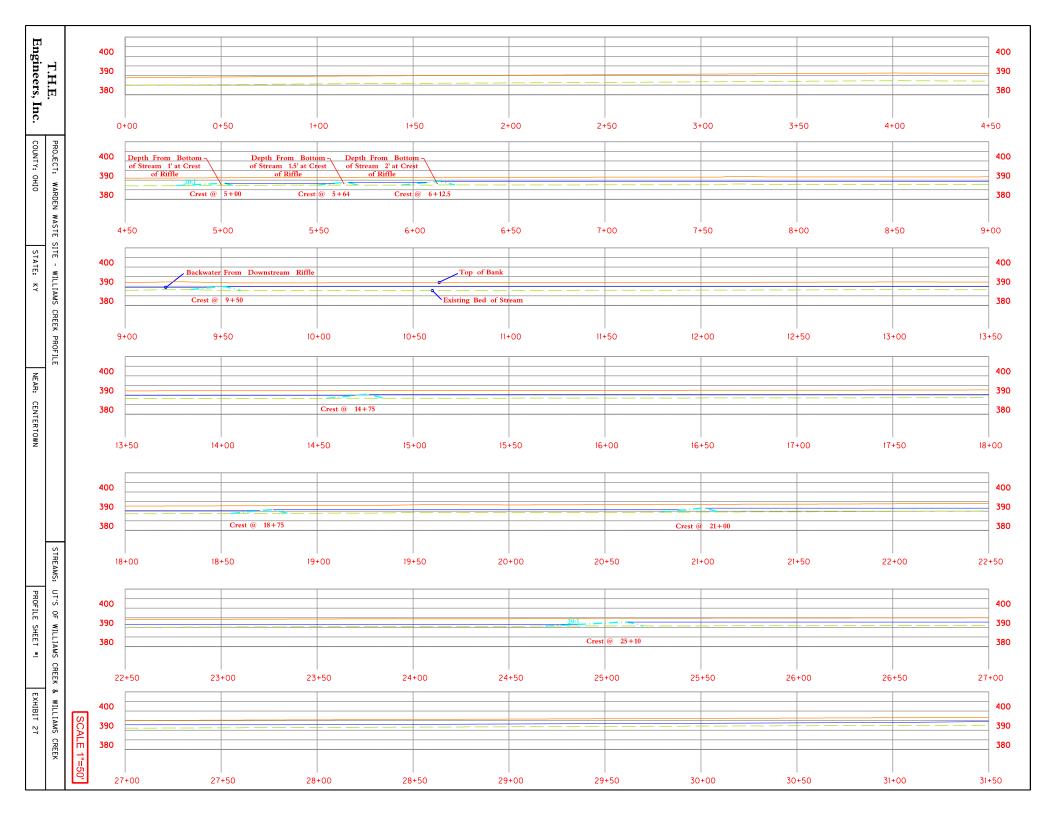


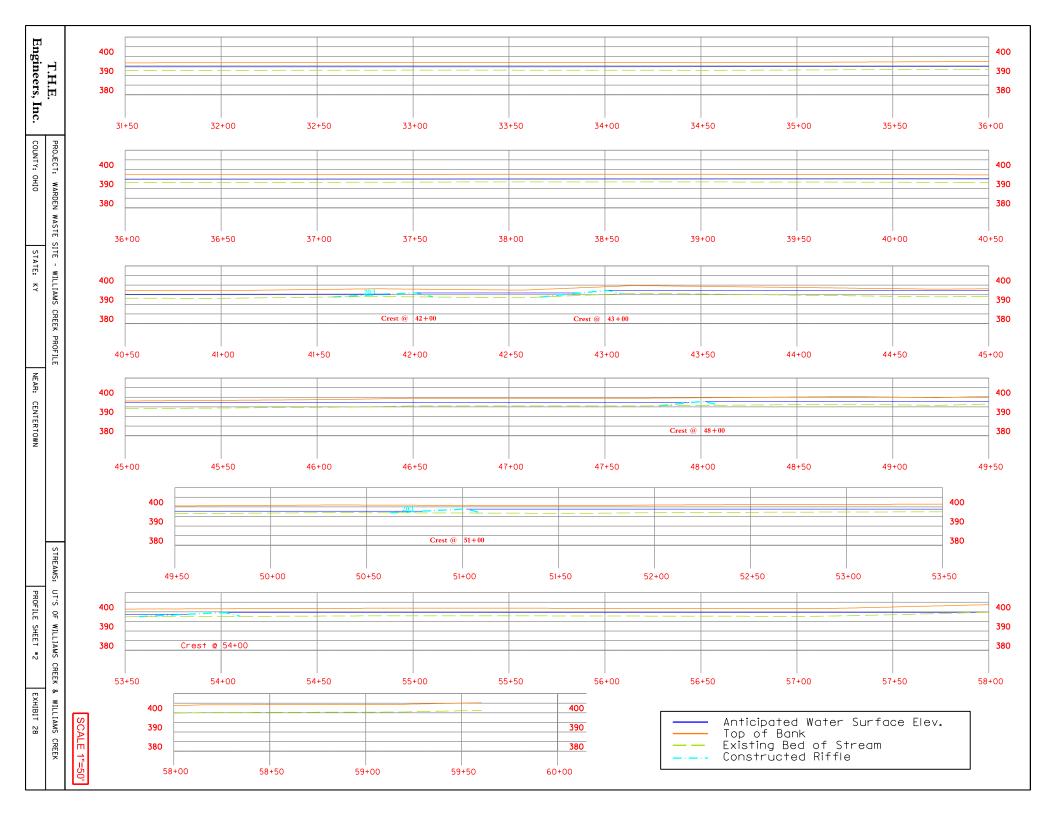


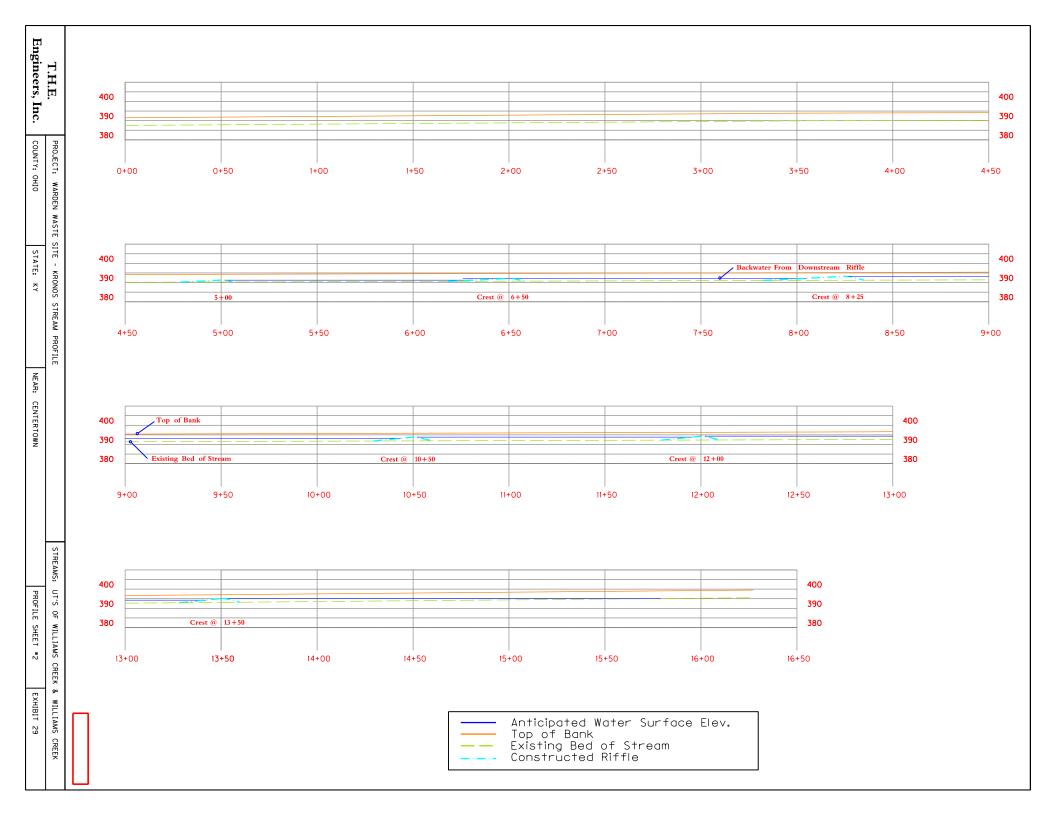








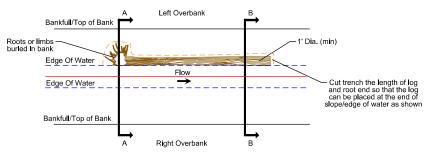


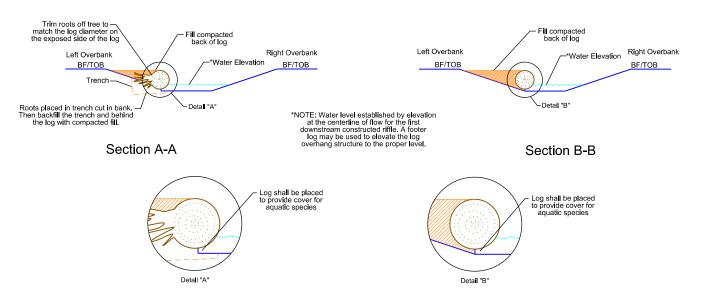


Habitat Structure Details

Williams Creek and Kronos Channel

Log Overhang Structure

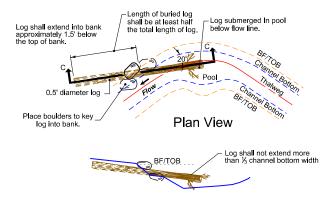




Root Wad

Top of log shall be positioned approximately 1.5' below the top of bank. Length of buried log shall be a minimum of 4' and shall be 1' - 3' in diameter. Flow Log shall be positioned in such a way that only the root ball is exposed. Plan View

Submerged Log Structure



Section C-C

I.H.E.			
Engineers, Inc.	COUNTY:	01	

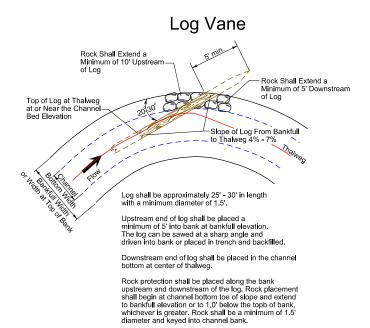
PROJECT: WARDEN WASTE MINE SITE - PROPOSED MITIGATION

STREAM: WILLIAMS CREEK AND KRONOS CHANNEL

STATE: KY NEAR: CENTERTOWN ITEM: HABITAT STRUCTURE DETAILS

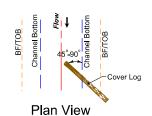
Habitat Structure Details

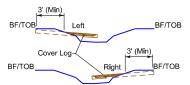
Williams Creek and Kronos Channel



The log at bankfull shall be buried into the channel bank a minimum of 5'.

Cover Log

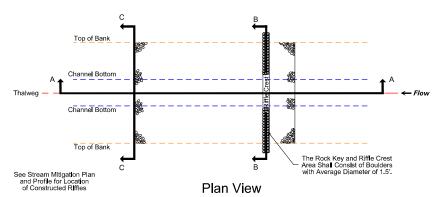


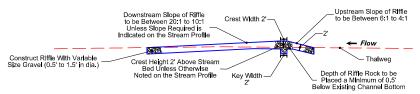


Cross Section View
Cover log shall consist
of a 0.5' to 1.0' diameter
log placed at or just below the
anticipated water line created
by backwater from the first
downstream constructed riffle.
One end of log will extend a
minimum of 3.0' into channel
bank and other end will extend
to ½ to ½ channel bottom
width. The log shall be angled
in upstream direction.

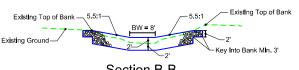
Log will alternate sides. (See Plan Sheets)

Constructed Riffle

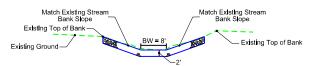




Riffle Profile Along Thalweg (Section A-A)



Section B-B Through Crest of Riffle



Section C-C At Either End of Riffle

T.H.E. Engineers, Inc. PROJECT: WARDEN WASTE MINE SITE - PROPOSED MITIGATION

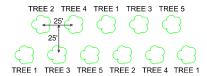
STREAM: WILLIAMS CREEK AND KRONOS CHANNEL

COUNTY: OHIO STATE: KY NEAR: CENTERTOWN ITEM: HABITAT STRUCTURE DETAILS

RIPARIAN ZONE PLANTING NOTES

(USE OPTION ONE OR OPTION TWO FOR TREE PLANTINGS)

PLAN VIEW: PLANTING DETAIL RPM Riparian Trees (Option One)



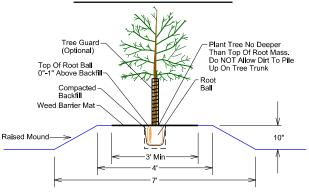
RPM RIPARIAN TREE PLANTINGS (OPTION ONE)

- 1. Only trees that have been produced by the Root Production Method (RPM) shall be planted in the Riparian zone.
- 2. The trees shall be three gallon container grown.
- 3. The trees shall be planted between the dates of October 1 and
- 4. Trees in the same row shall be planted on 25 foot spacing.
- ★5. The first row of trees nearest the channel shall be planted approximately 8 feet beyond the shrub plantings.
- The second row shall be planted 25 feet behind the first row.
 The subsequent rows will also be on 25 foot spacing.
- 7. The trees shall be planted in a staggered pattern, not one directly
- ★8. The trees shall be planted with alternating species.

RECOMMENDED PROCEDURES FOR PLANTING RPM TREES

- Site preparation trees are to be planted on a raised mound of existing soil. The mound shall be 8-10 inches high after mild compaction. The base of the mound shall have a minimum width of seven feet with a flat crown (top) at approximately four feet.
- 2. The hole shall be approximately the same size as the container (10 inch diameter-8 inch depth).
- ★3. After unloading trees, they shall be watered thoroughly and protected from excessive heat or cold. Do not allow rootball to freeze or dry out.
- ★4. If the trees are not to be planted for several days or weeks, they should be watered every 3-4 days and again immediately before planting.
- ★5. Remove the plastic container in which the trees have been growing prior to planting. Do not disturb rootball after container has been
- ★6. Do not plant trees any deeper than the level at which they were growing in the container. It is acceptable to plant the trees 1 inch above the level they were growing in the container.
 - 7. Trees planted between October 1 and December 15, will require the application of a slow release fertilizer after planting. 1-1½ tablespoons around drip zone is recommended. An analysis of 27-3-7 with I.B.D.U. or similar is recommended.

RPM TREE PLANTING DETAIL



PLAN VIEW: PLANTING DETAIL NON - RPM Riparian Trees (Option Two)



TREE PLANTING (OPTION TWO)

- 1. Trees shall be container grown or bare root.
- 2. Bare root stock must be a minimum 30" (inches) in height and planted on 10' x 10' spacing in a staggered pattern.
- 3. Three-gallon trees shall be planted on 19' x 19' spacing in a staggered pattern.
- NOTE: Option One notes with ★ also apply to Option Two

THE FOLLOWING TREES WILL BE USED FOR BOTH OPTIONS

An equal amount of the following trees are to be planted throughout the riparian zone.

PERRINIAL AND INTERMITTENT STREAM TREE LIST

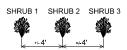
Tree 1: Shellbark hickory (Carya laciniosa)
Tree 2: Cherrybark oak (Quercus pagoda)
Tree 3: Willow oak (Quercus phellos)
Tree 4: Water oak (Quercus nigra)
Tree 5: White oak (Quercus alba)

EPHEMERAL STREAM TREE LIST

Tree 1: Shagbark hickory (Carya glabra)
Tree 2: American beech (Fagus grandifolia)
Tree 3: Shingle oak (Quercus imbricaria)
Tree 4: Post oak (Quercus stellata)
Tree 5: Shumard oak (Quercus shumardii)

SHRUB PLANTINGS (These will not be RPM Plantings)

PLAN VIEW: SHRUB PLANTING DETAIL



The following shrubs are to be planted near bankfull elevation. See typical cross sections for number of rows and placement.

Shrub 1: Rough-leaf Dogwood (<u>Cornus drummondii</u>) Shrub 2: Strawberry Bush (<u>Euonymus americanus</u>) Shrub 3: Indigo Bush (<u>Amorpha fruiticosa</u>)

Three gallon container shrubs shall be planted on approximate 4' spacing with an equal amount of each species planted in random sequence.

SEEDING:

The following native grasses will be sown along both stream banks and throughout the riparian zone:

Switchgrass (<u>Panicum virgatum</u>)
Virginia Wild Rye (<u>Elymus virginicus</u>)
Rough Barnyard Grass (<u>Echinochloa muricata</u>)
Annual Rye (<u>Lollum perenne</u>)
Big bluestream (<u>Andropogn gerardii</u>)
Forking panic grass/smooth panic grass
(<u>Dichanthelium dichotomum</u>/ <u>dichotomiflorum</u>) 20% 20% 20%

Apply seed at a rate of 20 pounds/acre or as recommended by seed supplier.

Straw mulch or erosion control blanket shall be placed immediately following seeding.

Additional native species may be substituted based on approval of Army Corps of Engineers

Riparian Zone Width will be a minimum of 100' for IntermIttent streams

Shrub plantings and seeding will be the same for each option.

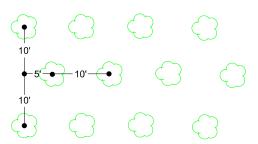
T.H.E. Engineers, Inc. PROJECT: WARDEN WASTE MINE SITE - PROPOSED MITIGATION

STREAM: WILLIAMS CREEK AND KRONOS CHANNEL

COUNTY: OHIO STATE: KY NEAR: CENTERTOWN ITEM: STREAM PLANTING NOTES EXHIBIT 32

WETLAND PLANTING DETAILS

If using tree seedlings, use 10 foot spacing.



Planting Quantities Shall Meet Densities Stated In The Wetland Mitigation Planting Plan. Plant Locations Shall Be Irregularly Spaced And Distributed Such That No Area Is Dominated By Any Single Species

WETLAND PLANTING SPECIES LIST

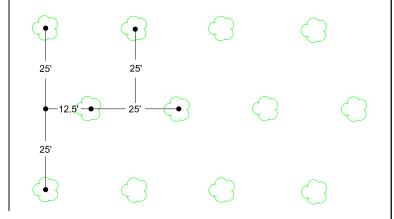
TREES

Shellbark hickory (Carya laciniosa)
Cherrybark oak (Quercus pagoda)
Pin oak (Quercus palustris)
Swamp white oak (Quercus bicolor)
Willow oak (Quercus phellos)
Baldcypress (Taxodium distichum)

HERBACEOUS SEED MIX

Cardno JFNew's "Wooded Wetland Establishment" seed mix OR
Green bulrush (<u>Scirpus atrovirens</u>)
Virginia wild rye (<u>Elymus virginicus</u>)
Fox sedge (<u>Carex vulpinoidea</u>)
Soft rush (<u>Juncus effusus</u>)
Woolgrass (<u>Scirpus cyperinus</u>)
Common sneezeweed (<u>Helenium autumnale</u>)

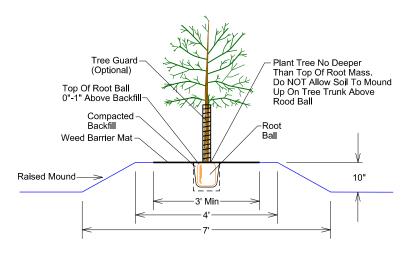
If using RPM trees, use 25 foot spacing. (non-RPM 3-gal. trees, use 19 foot spacing)



RECOMMENDED PROCEDURES FOR PLANTING RPM TREES

- 1. Site preparation trees are to be planted on a raised mound of existing soil. The mound shall be 8-10 inches high after mild compaction. The base of the mound shall have a minimum width of seven feet with a flat crown (top) approximately three to four feet in width.
- The hole shall be approximately the same size as the container (10 inch diameter-8 inch depth) or slightly larger.
- After unloading trees, they shall be watered thoroughly and protected from excessive heat or cold. Do not allow rootball to freeze or dry out.
- 4. If the trees are not to be planted for several days or weeks, they should be watered every 3-4 days and again immediately before planting.
- 5. Remove the plastic container in which the trees have been growing prior to planting. Rough up the sides and bottom of planting hole so roots can penetrate the soil. Position tree in hole with top of root mass level with top of mound. Backfill hole with loose soil.
- 6. Trees planted between October 1 and December 10, will require the application of a slow release fertilizer after trees are dormant in late fall or winter. 1 tablespoon of Scottfield fertilizer 27-3-6 with IBDU or equal applied to the soil around the base of the trees is recommended.
- 7. Install 4'x4' weed mat, if desired.
- 8. Install 24" tree guard around tree, if desired.
- Planted trees should be watered daily for 7 to 10 days, then watered every other day for the next 2 weeks (or the equivalent in rainfall).

RPM TREE PLANTING DETAIL



T.H.E. Engineers, Inc. PROJECT: WARDEN WASTE MINE SITE - PROPOSED MITIGATION

COUNTY: OHIO STATE: KY NEAR: CENTERTOWN

ITEM: PROPOSED WETLAND PLANTING DETAIL

EXHIBIT 33

APPENDIX

(In the order they appear)

- Stream Assessment Sheets
- Photographs
- Wetland Delineation Forms
- Photographs

STATION: WP 557 DRAINAGE AREA (AC) BASINWATERSHED Green River/Williams Creek	STREAM NAME: P	-1 US#1 (William	s Creek)	LOC	ATION:	Warden Waste Site-upp	per segi	ment of Williams Creek
DATE 2/19/14 TIME 9/.55 FT DAM DPM INVESTIGATORS; John Bostonwikill Sampson	STATION: WP 557	DRAINAGE A	AREA (AC)	BAS	IN/WATERSHI	ED Green River	/Williar	ms Creek
PChem: Temp (°F) 39.9 D.O. (mg/l) % Saturation pH(S.U.) Cond. 173.7 Grab	LAT: 37-24-29.9	LONG:	87-03-47.7	COU	INTY; O	hio USGS 7.5 T	OPO;	Equality
WEATHER: Now	DATE: 2/19/14	ΓΙΜΕ: <i>9:35</i> ΕΤ	☑ AM □PM	INVI	ESTIGATORS;	John Bottom/Bi	ll Samp	son
P-Chem: Temp ("F) 39.9 D.O. (mg/l) % Saturation pH(S.U.) Cond. 173.7 Grab	TYPE SAMPLE: P-Cl	HEM 🔲 Macı	roinvertebrate	🗖 FISH 🔲 l	BACT.			
Clear/sunny	WEATHER: No					rain in the last 7 days?	Snow	
Content Cont								
PC-Chem: Temp (TF)				Air tempe	rature 45	_ °F. Inches rainfa	ll in pas	st 24 hours 0.1 in
INSTREAM WATERSHED FEATURES					Cloud Cover			
Stream Width BCV Stream Width BF Stream Width BF Stream Width BF Stream Bottom With Avg. Bankfull Depth J.0 ft Depth Mining Commercial Pasture Grazing			(mg/l)	% Saturation	pH(5	S.U.) Cond.	_1	173.7
Stream Width EOW Stream Width BCP Stream Bottom Width BCP Stream Bottom Width BCP Stream Bottom Width 2.5 ft Deep Mining Commercial Pasture/Grazing Past								
Stream Brottom Width BF Stream Brottom Width Avg. Bunkfull Depth 1.0 ft Deep Mining Construction Forest Stream Flow; Commercial Pasture/Grazing Silviculture Silviculture Deep Mining Construction Stream Flow; Stream Flow; Stream Flow; Commercial Pasture/Grazing Silviculture Silviculture Deep Mining Construction Stream Flow; Stream Flow; Stream Flow; Construction Porcet Commercial Pasture/Grazing Silviculture Stream Flow; Construction Proced Commercial Pasture/Grazing Pasture/Grazing Silviculture Deep Mining Construction Proced Commercial Pasture/Grazing Pasture/G								
Stream Bottom Width 2.5 ft							_4	
Avg. HPO Depth Riffle				g		· · · — · · · ·		zin a
Avg. HPO Depth Riffle								
Hydraulic Structures:						-		
□ Dams □ Bridge Abutments □ Dry □ Pooled □ Low □ Normal □ Perennial □ Intermittent □ Other □ Culverts □ Dom. Tree/Shrub Taxa □ Canopy Cover; □ Fully Exposed (0.25%) □ Dredging □ Channel Alterations; □ Dredging								P
Island		Bridge Abutme			ed 🗖 Low			
Riparian Vegetation: Dominate Type: Canopy Cover; Dominate Type: Canopy Cover; Dominate			-	,				
Dominate Type: Trees Strubs Sycamore Fully Exposed (0-25%) Channelization Characterization Product Product Partially Exposed (25-50%) Channelization Characterization Product Produ					rapid of forie		- P-	_ Беер
Dominate Type: Trees Strubs Sycamore Strubs Sycamore	Rinarian Vegetation:		Dom Tree/Shri	ıh Tava	Canony Cove	ar.	Char	nnel Alterations:
□ Grasses □ Herbaceous Pinoak Number of Strata 3 Blackgum □ Partially Exposed (25-50%) □ Channelization □ Partially Shaded (57-10%) □ Partially Shaded (57-10%) □ Partially Shaded (57-10%) □ Partially Shaded (57-10%) □ Partially RR berm next to channel RR berm next to c				io ruxu	□ Fully Ex	xposed (0-25%)		
Substrate	✓ Trees ✓		Sycamore					
Substrate E Est. P.C Riffle 30 % Run; 15 % Pool 55 % Silt/Clay (<0.06 mm) 30 75 80 Gravel (2-64 mm) 10 10 10 Cobble (64-256 mm) 80 Bedrock Parameter Optimal Greater Insulation and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat flavorable for epifaunal (i.e., logs/snags that are not new fall and not transient. SCORE 20 19 18 17 16 Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16 SCORE 20 19 18 17 16 Even mix of large shallow, large deep, snall-shallow, small-deep pools present. SCORE 20 19 18 17 16 SCO								(☑ Full □ Partial)
Silt/Clay (<0.06 mm) 30 75 80	Number of Strata	3	Blackgum		☐ Fully Sh	naded (75-100%)	RR l	perm next to channel
Silt/Clay (<0.06 mm) 30 75 80								
Sand (0.06-2 mm) 10	Substrate Est.	P.C	Riffle 30	<u>0</u> %	Run;		Pool	55 %
Gravel (2-64 mm) 60								
Boulders (>256 mm)								
Boulders (>256 mm)			60	0	1	15		10
Bedrock Habitat Condition Category Parameter Optimal Greater than 50% of substrate favorable for epifaunal colonization and fish cover, mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient. Characterization Score 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0	` '							
Parameter Optimal Suboptimal 30-50% mix of stable habitat; favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential; (i.e., logs/snags that are not new fall and not transient. SCORE 20 19 18 17 16 Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16 Total transient SCORE SCORE 20 19 18 17 16 Total transient SCORE 20 19 18 17 16 Total transient SCORE SCORE SCORE 20 19 18 17 16 Total transient SCORE SCORE SCORE SCORE SCORE SCORE SCORE Score transient								
Parameter					Condition C	Category		
Greater than 50% of substrate favorable for epifaunal Substrate/ Available of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient. SCORE 20 19 18 17 16 Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16 Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16 Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16 Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16 Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16 Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16 Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 54 3 2 1 0 Hard-pan clay or bedrock; non root mat; non submerged vegetation. SCORE 20 19 18 17 16 SCORE 30-50% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed. All mud or clay or sand bottom; little or no root mat; non submerged vegetation. SCORE SCORE 30 19 18 17 16 Mixture of substrate materials, with gravel and firm sand submerged vegetation prevalent. SCORE 30 19 18 17 16 SCORE 31 10 19 8 7 6 SCORE 31 10 19 8 7 6 SCORE 32 10 10 19 8 7 6 SCORE 33 2 10 0 SCORE 34 3 2 1 0 Majority of pools large-deep; very few shallow. Score of additional substrate in the form of new fall, but no		Opt	imal	Subo				Poor
Substrate/ Available Cover Co							abitat;	
Available Cover Of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient. SCORE 20 19 18 17 16 Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16 Even mix of large shallow, small-deep pools present. Adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale) Mixture of soft sand, mud, or clay or sand bottom; little or no root mat; no submerged vegetation. SCORE 20 19 18 17 16 Even mix of large shallow, largedeep, small-shallow, small-deep pools present. Mediculate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale) Mixture of soft sand, mud, or clay or sand bottom; little or no root mat; no submerged vegetation. SCORE 20 19 18 17 16 Even mix of large shallow, largedeep, small-shallow, small-deep pools present. Majority of pools large-deep; very few shallow. Score prevalent than deep pools. Shallow or pools absent.			1			3		habitat" lack of habitat is
Cover undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient. SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 Mixture of soft sand, mud, or clay or sand bottom; little or no root mat; no submerged vegetation. SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 Majority of pools large-deep; wery few shallow. SCORE 3. Pool Availability Majority of pools large-deep; very few shallow. Score pools present.							uently	-
stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient. SCORE 20 19 18 17 16 Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16 Mixture of soft sand, mud, or clay or sand prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16 Mixture of soft sand, mud, or clay or sand bottom; little or no root mat; no submerged vegetation. SCORE 20 19 18 17 16 SCORE 20 19 18 17 16 Even mix of large shallow, large-deep, small-shallow, small-deep pools present. Mixture of soft sand, mud, or clay or sand bottom; little or no root mat; no submerged vegetation. SCORE SCORE 20 19 18 17 16 Even mix of large shallow, large-deep, small-shallow, small-deep pools present. Majority of pools large-deep; very few shallow. SCORE SCORE 20 19 18 17 16 Even mix of large shallow, small-deep pools present.				-		disturbed or removed.		or lacking.
allow full colonization potential (i.e., logs/snags that are not new fall and not transient. SCORE 20 19 18 17 16 Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16 Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16 Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16 SCORE 20 19 18 17 16 Even mix of large shallow, large-deep, small-shallow, small-deep pools present. SCORE 3. Pool Availability Substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale) Mixture of substrate materials, Mixture of soft sand, mud, or clay or sand bottom; little or no root mat; no submerged vegetation. Score and prevalent than deep pools. Shallow pools much more prevalent than deep pools. Shallow or pools absent.	Cover							
(i.e., logs/snags that are not new fall and not transient. SCORE 20				1				
SCORE 20 19 18 17 16 Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16 Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16 Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 All mud or clay or sand bottom; little or no root mat; no submerged vegetation. SCORE 20 19 18 17 16 Even mix of large shallow, largedeep, small-shallow, small-deep pools present. SCORE SCORE 3. Pool Availability SCORE Colonization (may rate at high end of scale) Mixture of soft sand, mud, or clay or sand bottom; little or no root mat; no submerged vegetation. SCORE SCORE SCORE SCORE SCORE SCORE SCORE Score Shallow pools much more prevalent than deep pools. Shallow or pools absent.								
SCORE 20 19 18 17 16 Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16 Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16 Mixture of soft sand, mud, or clay or sand bottom; little or no root mat; no submerged vegetation. SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 Hard-pan clay or bedrock; no root mat; no submerged vegetation. SCORE 20 19 18 17 16 Even mix of large shallow, largedeep, small-shallow, small-deep pools present. Mixture of soft sand, mud, or clay or sand bottom; little or no root mat; no submerged vegetation. SCORE 3. Pool Availability Score Score Shallow pools much more prevalent than deep pools. Shallow or pools absent.				colonization	(may rate at			
Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16	GGODE	20 10	10 15 14			10 0 0		7 4 2 2 4 2
2. Pool Substrate/ Characterization with gravel and firm sand prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 Even mix of large shallow, largedeep, small-shallow, small-deep pools present. SCORE SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 Even mix of large shallow, small-deep pools present. Shallow pools much more prevalent than deep pools. Shallow or pools absent.	SCORE							
Characterization prevalent; root mats and submerged vegetation common. SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 Even mix of large shallow, largedeep, small-shallow, small-deep pools present. Shallow pools much more prevalent than deep pools. Shallow or pools absent.	2 Pool Substrate/							
submerged vegetation common. SCORE 20 19 18 17 16 Even mix of large shallow, larged pools present. Majority of pools large-deep; very few shallow. SCORE SCORE 20 19 18 17 16 Even mix of large shallow, larged pools present. Majority of pools large-deep; very few shallow. Shallow pools much more prevalent than deep pools. Shallow or pools small-shallow or pools absent.					-	*		no root mat of vegetation.
SCORE 20 19 18 17 16 Even mix of large shallow, large-deep, small-shallow, small-deep pools present. Present. Majority of pools large-deep; Shallow pools much more prevalent than deep pools. Shallow pools much more prevalent than deep pools. Shallow or pools small-shallow or pools absent.		± .				3-2-1-25-141101		
3. Pool Availability Even mix of large shallow, large-deep, small-shallow, small-deep pools present. Majority of pools large-deep; Shallow pools much more prevalent than deep pools. Majority of pools small-shallow or pools absent.								
3. Pool Availability Even mix of large shallow, large-deep, small-shallow, small-deep pools present. Majority of pools large-deep; Shallow pools much more prevalent than deep pools. Majority of pools small-shallow or pools absent.	SCORE	20 19	18 17 16	15 14	13 12 11	10 9 8 7	6	5 4 3 2 1 0
3. Pool Availability deep, small-shallow, small-deep very few shallow. prevalent than deep pools. shallow or pools absent.				Majority of po	ools large-deep;			Majority of pools small-
SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0	3. Pool Availability	deep, small-sha		very few shall	ow.	prevalent than deep pool	s.	
	SCORE	20 19	18 17 16	15 14	13 12 11	10 9 8 7	6	5 4 3 2 1 0

	Little or no enlargement of	Some new increase in bar	Moderate deposition of new	Heavy despoits of fine
4. Sediment Deposition	islands or point bars and less	formation, mostly from	gravel, sand or fine sediment	material, increased bar
	than 20% of the bottom affected by sediment	gravel, sand or fine sediment; 20-50% of the bottom	on old and new bars; 50-80% of the bottom affected;	development; 80% of the bottom changing frequently;
	deposition.	affected; slight deposition in	sediment deposits at	pools almost absent due to
	deposition.	pools.	obstructions, constrictions,	substantial sediment
		F	and bends; moderate	deposition.
			deposition of peols prevalent.	-
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both	Water fills > 75% of the	Water fills 5.3% of the	Very little water in channel
	lower banks, and minimal	available channel; or <25%	available channel, and/or	and mostly present as
	amount of channel substrate is exposed.	of channel substrate is exposed.	riffle substrates are mostly exposed.	standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging	Some channelization present,	Channelization may be	Banks shored with gabion of
	absent or minimal; stream with	usually in areas of bridge	extensive; embankments or	cement; over 80% of the
	normal pattern.	abutments; evidence of past	shoring structures present on	stream reach channelized and
		channelization, i.e., dredging,	both banks; and 40-80% of	disrupted. Instream habitat
		(greater than past 20 yr.) may	stream reach channelized and	greatly altered or removed
		be present, but recent channelization is not present.	disrupted.	entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream	The bends in the stream	The bends in the stream	Channel straight; waterway
	increase the stream length 3-4	increase the stream length	increase the stream length 2-	has been channelized for a
	times longer than if it was a	2-3 times longer than if it	1 times longer than if it was	long distance.
	straight line. (Note – channel	was in a straight line.	in a straight line.	
	braiding is considered normal in coastal plains and other			
	low-lying areas. This			
	parameter is not easily rated in			
	these areas.			
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 3 2 1 0
8. Bank Stability	Banks stable; evidence of	Moderately stable,	Moderately unstable, 30-60%	Unstable, many eroded areas,
	erosion or bank failure absent	infrequent, small areas of	of bank in reach has areas of	"raw" areas frequently along
1				
	or minimal; little potential for	erosion mostly healed over.	erosion, high erosion	straight sections and bends;
	or minimal; little potential for future problems. <5% of bank affected.	erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	erosion, high erosion potential during floods.	straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.
SCORE	or minimal; little potential for future problems. <5% of bank	erosion mostly healed over. 5-30% of bank in reach has	erosion, high erosion	straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional
(LB)	or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9	erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6	erosion, high erosion potential during floods.	straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
(LB) SCORE	or minimal; little potential for future problems. <5% of bank affected.	erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	erosion, high erosion potential during floods.	straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.
(LB) SCORE (RB)	or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9	erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6	erosion, high erosion potential during floods. 5 4 3 5 4 3	straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 2 1 0
(LB) SCORE (RB)	or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9	erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank	erosion, high erosion potential during floods.	straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the
(LB) SCORE (RB) 9. Vegetative	or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone	erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of	erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption	straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of
(LB) SCORE (RB) 9. Vegetative Protection	or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation,	erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-	erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil	straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is
(LB) SCORE (RB) 9. Vegetative Protection	or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory	erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption	erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation	straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has
(LB) SCORE (RB) 9. Vegetative Protection	or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody	erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full	erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half	straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5
(LB) SCORE (RB) 9. Vegetative Protection	or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative	erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any	erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble	straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has
(LB) SCORE (RB) 9. Vegetative Protection	or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not	erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant	erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half	straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average
(LB) SCORE (RB) 9. Vegetative Protection	or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants	erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-	erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble	straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average
(LB) SCORE (RB) 9. Vegetative Protection (score each bank)	or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
(LB) SCORE (RB) 9. Vegetative Protection (score each bank)	or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants	erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant	erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble	straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average
(LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB)	or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9	erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
(LB) SCORE (RB) 9. Vegetative Protection (score each bank)	or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
(LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE	or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9	erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
(LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB) 10. Riparian Vegetative Zone Width (score	or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9 Width of riparian zone > 18 meters; human activities (i.e.,	erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 Width of riparian zone 12-18 meters; human activities have	erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 5 4 3 Width of riparian zone 6-12 meters; human activities has	straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 Width of riparian zone <6 meters; little or no riparian
(LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB) 10. Riparian Vegetative Zone Width (score each bank riparian	or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9 Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-	erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 Width of riparian zone 12-18 meters; human activities have impacted zone only	erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 5 4 3 Width of riparian zone 6-12	straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 Width of riparian zone <6 meters; little or no riparian vegetation due to human
(LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB) 10. Riparian Vegetative Zone Width (score	or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9 Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not	erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 Width of riparian zone 12-18 meters; human activities have	erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 5 4 3 Width of riparian zone 6-12 meters; human activities has	straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 Width of riparian zone <6 meters; little or no riparian
(LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB) 10. Riparian Vegetative Zone Width (score each bank riparian zone).	or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9 Right Bank 10 9 Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not impacted zone	erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 5 4 3 Width of riparian zone 6-12 meters; human activities has inpacted zone a great deal.	straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
(LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB) 10. Riparian Vegetative Zone Width (score each bank riparian zone).	or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9 Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not	erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 Width of riparian zone 12-18 meters; human activities have impacted zone only	erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 5 4 3 Width of riparian zone 6-12 meters; human activities has	straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 Width of riparian zone <6 meters; little or no riparian vegetation due to human
(LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB) 10. Riparian Vegetative Zone Width (score each bank riparian zone).	or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9 Right Bank 10 9 Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not impacted zone	erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 5 4 3 Width of riparian zone 6-12 meters; human activities has inpacted zone a great deal.	straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.

STREAM NAME: P-	-1 US #2 (Willian	ıs Creek)	LOCA	ATION:	Warden Waste Site-n	ear confl	luence of East Fork
STATION: WP558	DRAINAGE A	AREA (AC)	BASI	N/WATERSHI	ED <i>Green Riv</i>	er/Willia	ms Creek
LAT: 37-24-25.2	LONG:	87-03-46.6	COU	NTY; O	hio USGS 7.5	ТОРО;	Equality
DATE: 2/19/14	ΓΙΜΕ: <i>10:00</i> ΕΤ	☑ AM □ PM	INVE	ESTIGATORS;	John Bottom/I	Bill Samp	son
TYPE SAMPLE: P-CI				BACT.	voin Bonomy	THE SHAMP	
WEATHER: No		24 hours			rain in the last 7 day	s? Snow	·
	□ He	avy rain	□Yes	✓No	•		
	□Inte	eady rain ermittent showers	Air temper 25 % (rature 46 Cloud Cover	_ °F. Inches rain	fall in pa	st 24 hours <u>0.1</u> in
P-Chem: Temp (°F)		ar/sunny (mg/l)	% Saturation	pH(S	S.U.) Con	d. 2	257.0
INSTREAM WATERSH		<u> </u>	-	`	<u> </u>		
FEATURES		OCAL WATERS	SHED FEATU	RES:			
Stream Width EOW		redominant Surrou	_				
Stream Width BF	10.5 ft	Surface Mining	g	□ Construct	tion 🗹 Fo	rest	
Stream Bottom Width	ft □			□ Commerc		sture/Gra	C
Avg. Bankfull Depth	1.0 ft			☐ Industrial		viculture	
Avg. H ² O Depth Riffle	<u>0.1</u> ft □	Land Disposal		☐ Row Crop	ps 🗖 Ur	oan Runc	off/Storm Sewers
Hydraulic Structures:		St	ream Flow;			Stream 7	Tyne:
	Bridge Abutme			ed 🗖 Low	□ Normal	☑ Per	
	Waterfalls	☑ Hig		Rapid or Torre			hemeral
□ Other □	Culverts						
Riparian Vegetation:		Dom. Tree/Shru	ıb Taxa	Canopy Cove	er;	Chai	nnel Alterations;
Dominate Type:		Red maple		☐ Fully Ex	(posed (0-25%)		Dredging
✓ Trees ✓	Shrubs	Sycamore			Exposed (25-50%)		Channelization
☐ Grasses ☑	Herbaceous	Pinoak			Shaded (50-75%)		(Full Partial)
Number of Strata	<u> </u>	Walnut		☐ Fully Sh	aded (75-100%)	Bern	n next to channel
		Tulip poplar					
	P.C	Riffle 10		Run;	10 %	Pool	
Silt/Clay (<0.06 mm)		10)		10		100
Sand (0.06-2 mm)		0.4	2		0.0		
Gravel (2-64 mm)		90)		90		
Cobble (64-256 mm) Boulders (>256 mm)							
Bedrock							
Habitat				Condition C	ategory	I	
Parameter	Opt	imal	Subor		Marginal		Poor
	Greater than 5	0% of substrate	30-50% mix of		10-30% mix of stable		Less than 10-% stable
1. Epifaunal		or epifaunal	well suited		habitat availability le		habitat" lack of habitat is
Substrate/ Available		l fish cover; mix	colonization adequate 1	potential; nabitat for	desirable; substrate fr disturbed or removed.	equently	obvious; substrate unstable or lacking.
Cover		ibmerged logs, cobble or other	maintenance of		disturbed of femoved.		of facking.
20.01		and at stage to	presence of				
		nization potential	substrate in the	e form of new			
		that are not new	fall, but not ye				
	fall and not trans	sient.	colonization (
SCORE	20 19	18 17 16	high end of sca	13 12 11	10 9 8 7	6	5 4 3 2 1 0
SCORE		ostrate materials,	Mixture of soft		All mud or clay		Hard-pan clay or bedrock;
2. Pool Substrate/	with gravel		clay; mud may		bottom; little or no r		no root mat or vegetation.
Characterization	_		some root	mats and	no submerged vegetati		
	prevalent; ro			made and			
	prevalent; roo submerged vege		submerged	vegetation			
SCORE	submerged vege		submerged present.		10 9 7	6	5 4 3 2 1 0
	submerged vege 20 19 Even mix of lar	tation common. 18 17 16 ge shallow, large-	submerged present. 15 14 1 Majority of po	vegetation 13 12 11 ols large-deep;	Shallow pools muc	n more	Majority of pools small-
SCORE 3. Pool Availability	submerged vege 20 19 Even mix of lar deep, small-sha	tation common. 18 17 16	submerged present.	vegetation 13 12 11 ols large-deep;		n more	
	submerged vege 20 19 Even mix of lar deep, small-sha pools present.	tation common. 18 17 16 ge shallow, large-	submerged present. 15 14 1 Majority of po	vegetation 13 12 11 ols large-deep;	Shallow pools muc	n more	Majority of pools small-

	Little or no enlargement of	Some new increase in bar	Moderate deposition of new	Heavy despoits of fine
4. Sediment Deposition	islands or point bars and less	formation, mostly from	gravel, sand or fine sediment	material, increased bar
	than 20% of the bottom	gravel, sand or fine sediment;	on old and new bars; 50-80%	development; 80% of the
	affected by sediment	20-50% of the bottom	of the bottom affected; sediment deposits at	bottom changing frequently;
	deposition.	affected; slight deposition in	sediment deposits at obstructions, constrictions,	pools almost absent due to substantial sediment
		pools.	and bends; moderate	deposition.
			deposition of pools prevalent.	deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both	Water fills > 75% of the	Water 25-75% of the	Very little water in channel
	lower banks, and minimal	available channel; or <25%	available channel, and/or	and mostly present as
	amount of channel substrate is	of channel substrate is	riffle substrates are mostly	standing pools.
	exposed.	exposed.	exposed.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging	Some channelization present,	Channelization may be	Banks shored with gabion of
	absent or minimal; stream with	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream reach channelized and
	normal pattern.	abutments; evidence of past channelization, i.e., dredging,	shoring structures present on both banks; and 40-80% of	disrupted. Instream habitat
		(greater than past 20 yr.) may	stream reach channelized and	greatly altered or removed
		be present, but recent	disrupted.	entirely.
		channelization is not present.	disrupted.	charery.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 6 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream	The bends in the stream	The bends in the stream	Channel straight; waterway
	increase the stream length 3-4	increase the stream length	increase the stream length 2-	has been channelized for a
	times longer than if it was a	2-3 times longer than if it	1 times longer than if it was	long distance.
	straight line. (Note – channel	was in a straight line.	in a straight line.	
	braiding is considered normal			
	in coastal plains and other low-lying areas. This			
	parameter is not easily rated in			
	these areas.			
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 8 2 1 0
8. Bank Stability	Banks stable; evidence of	Moderately stable,	Moderately unstable, 30-60%	Unstable, many eroded areas,
	erosion or bank failure absent	infrequent, small areas of	of bank in reach has areas of	"raw" areas frequently along
	or minimal; little potential for	erosion mostly healed over.	erosion, high erosion	straight sections and bends;
	future problems. <5% of bank	5-30% of bank in reach has	potential during floods.	obvious bank sloughing; 60-
	affected.	areas of erosion.		100% of bank has erosional scars.
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB)				
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)				
9. Vegetative	More than 90% of the	70-90% of the streambank	50-70% of the streambank	Less than 50% of the
Protection	streambank surfaces and		surfaces covered by	
(score each bank)	immediate riparian zone	vegetation, but one class of	vegetation; disruption	by vegetation; disruptive of
	covered by native vegetation,	plants is not well-	obvious; patches of bare soil	streambank vegetation is
	including trees, understory shrubs, or nonwoody	represented; disruption evident but not affecting full	or closely cropped vegetation common; less than one-half	very high; vegetation has been removed to 5
	macrophytes; vegetative	plant growth potential to any	of the potential plant stubble	centimeters or less in average
	disruption through grazing or	great extent; more than one-	height remaining.	stubble height.
	mowing minimal or not	half of the potential plant		g
	evident; almost all plants	stubble height remaining.		
	allowed to grow naturally.			
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB)	Di IAB A 40	0 5	4 2	
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)	Width of sinosian name 10	Width of ringrica acres 12 10	Width of minorian mana 6 10	Width of minorian same of
10. Riparian Vegetative Zone Width (score	Width of riparian zone > 18 meters; human activities (i.e.,	Width of riparian zone 12-18 meters; human activities have	Width of riparian zone 6-12 meters; human activities has	Width of riparian zone <6 meters; little or no riparian
each bank riparian	parking lots, roadbeds, clear-	impacted zone only	inpacted zone a great deal.	vegetation due to human
zone).	cuts, lawns, or crops) have not	minimally.	mpactoa zone a great dear.	activities.
,.	impacted zone			
	1	0 7 (5 4 2	2 1 0
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB)				
	Left Bank 10 9 Right Bank 10 9	8 7 6	5 4 3	2 1 0

STREAM NAME: P-	-1 MS (Williams (Creek)	LOC	ATION:	Warden Waste Site-m	iddle sed	ction
STATION: WP 645	DRAINAGE A	AREA (AC)	BAS	IN/WATERSHI	ED <i>Green Rive</i>	er/Willia	ms Creek
LAT: 37-24-09.6	LONG:	87-03-43.8	COU	NTY; O	hio USGS 7.5	ТОРО;	Equality
DATE: 2/19/14	ΓΙΜΕ: <i>1:45</i> ΕΤ	□AM ☑ PM	INVI	ESTIGATORS;	John Bottom/E	ill Samp	oson
TYPE SAMPLE: P-C	HEM Macı			BACT.			
WEATHER: No	w Past 2	24 hours	Has there	been a heavy	rain in the last 7 days	? Snow	,
		eavy rain	□Yes	✓No			
		eady rain	Air tempe	rature <u>60</u>	_ °F. Inches rain	all in pa	sst 24 hours 0.1 in
☐ Clear ☑		ermittent showers ear/sunny		Cloud Cover			
P-Chem: Temp (°F)		-	% Saturation	pH(S	S.U.) Con-	d2	258.0
INSTREAM WATERSH	ED						
FEATURES		OCAL WATERS					
Stream Width EOW		redominant Surrou			tion 🗹 For	4	
Stream Width BF Stream Bottom Width	12.0 ft 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		g	□ Construct □ Commerce		esi ture/Gra	nzina
Avg. Bankfull Depth	1.5 ft	1 0		☐ Industrial		iculture/	
Avg. H ² O Depth Riffle	0.3 ft			□ Row Crop	-		off/Storm Sewers
Hydraulic Structures:			ream Flow;		•	Stream '	Type
	Bridge Abutme			ed 🗖 Low	□ Normal		rennial Intermittent
	Waterfalls	III.5		Rapid or Torre			hemeral Seep
□ Other □	Culverts		•	•		•	•
Riparian Vegetation:		Dom. Tree/Shru	ıb Taxa	Canopy Cove	er;	Cha	nnel Alterations;
Dominate Type:		Maple		☐ Fully Ex	xposed (0-25%)		Dredging
✓ Trees ✓	Shrubs	Redcedar			Exposed (25-50%)		Channelization
	Herbaceous	Pinoak			Shaded (50-75%)		(Full Partial)
Number of Strata	<u> </u>	Swamp chestnu	t oak	☑ Fully Sh	naded (75-100%)		
		1					
	P.C	Riffle30		Run;	30 %	Pool	
Silt/Clay (<0.06 mm)		20			25		80
Sand (0.06-2 mm) Gravel (2-64 mm)		20			25 50		10 10
Cobble (64-256 mm)		00)		30		10
Boulders (>256 mm)							
Bedrock							
Habitat		•		Condition C	ategory		
Parameter		imal		otimal	Marginal		Poor
1 F'C 1		0% of substrate		f stable habitat;	10-30% mix of stable		Less than 10-% stable
1. Epifaunal Substrate/		for epifaunal difish cover; mix	well suited colonization		habitat availability le		habitat" lack of habitat is obvious; substrate unstable
Available		i fish cover, finx ibmerged logs,		potential; habitat for	desirable; substrate fred disturbed or removed.	quentry	or lacking.
Cover		cobble or other	-	of populations;			
		and at stage to	presence o	f additional			
		nization potential		e form of new			
	fall and not trans	that are <u>not</u> new		et prepared for (may rate at			
	ran and <u>not</u> trans		high end of sca				
SCORE	20 19	18 17 16		13 12 11	10 9 8 7	6	5 4 3 2 1 0
		ostrate materials,		t sand, mud, or	All mud or clay of		Hard-pan clay or bedrock;
2. Pool Substrate/	with gravel			y be dominant;	bottom; little or no re		no root mat or vegetation.
Characterization	prevalent; roo submerged vege		some root submerged	mats and vegetation	no submerged vegetation	DI1.	
	submerged vege	tation common.	present.	vegetation			
SCORE	20 10	10 17 17	•	12 12 11	10 0 0 7	6	5 4 2 2 1 0
SCOKE		18 17 16 ge shallow, large-		ols large-deep;	10 9 8 7 Shallow pools much	more	5 4 3 2 1 0 Majority of pools small-
3. Pool Availability		llow, small-deep	very few shallo		prevalent than deep poo		shallow or pools absent.
SCORE	20 19	18 17 16	15 14	13 12 11	10 9 8 7	6	5 4 3 2 1 0

4 Cadiment Denseition	Little or no enlargement of	Some new increase in bar	Moderate deposition of new	Heavy despoits of fine
4. Sediment Deposition	islands or point bars and less than 20% of the bottom	formation, mostly from gravel, sand or fine sediment;	gravel, sand or fine sediment on old and new bars; 50-80%	material, increased bar development; 80% of the
	affected by sediment	20-50% of the bottom	of the bottom affected;	bottom changing frequently;
	deposition.	affected; slight deposition in	sediment deposits at	pools almost absent due to
		pools.	obstructions, constrictions,	substantial sediment
			and bends; moderate	deposition.
CCOPE	20 10 10 17 17	15 11 12 12 11	deposition of pools provalent.	
SCORE 5. Channel Flow Status	20 19 18 17 16 Water reaches base of both	15 14 13 12 11 Water fills > 75% of the	10 9 8 7 Water fills 25-73 of the	Very little water in channel
5. Chamier Flow Status	lower banks, and minimal	available channel; or <25%	available channel, and/or	and mostly present as
	amount of channel substrate is	of channel substrate is	riffle substrates are mostly	standing pools.
	exposed.	exposed.	exposed.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with	Some channelization present, usually in areas of bridge	Channelization may be extensive; embankments or	Banks shored with gabion of cement; over 80% of the
	normal pattern.	abutments; evidence of past	shoring structures present on	stream reach channelized and
	norman patterni	channelization, i.e., dredging,	both banks; and 40-80% of	disrupted. Instream habitat
		(greater than past 20 yr.) may	stream reach channelized and	greatly altered or removed
		be present, but recent	disrupted.	entirely.
SCORE	20 19 18 17 16	channelization is not present.	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	20 19 18 17 16 The bends in the stream	15 14 13 12 11 The bends in the stream	The bends in the stream	Channel straight; waterway
Chamier Sindosity	increase the stream length 3-4	increase the stream length	increase the stream length 2-	has been channelized for a
	times longer than if it was a	2-3 times longer than if it	1 times longer than if it was	long distance.
	straight line. (Note – channel	was in a straight line.	in a straight line.	
	braiding is considered normal in coastal plains and other			
	low-lying areas. This			
	parameter is not easily rated in			
	these areas.			
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent	Moderately stable, infrequent, small areas of	Moderately unstable, 30-60% of bank in reach has areas of	Unstable, many eroded areas, "raw" areas frequently along
	or minimal; little potential for	erosion mostly healed over.	erosion, high erosion	straight sections and bends;
	future problems. <5% of bank	5-30% of bank in reach has	potential during floods.	obvious bank sloughing; 60-
	affected.	areas of erosion.		1000/ of bomb boo sessional
i e				100% of bank has erosional
SCORE	Left Rank 10 9		5 4 3	scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	
SCORE (LB) SCORE	Left Bank 10 9 Right Bank 10 9		5 4 3	scars.
(LB)		8 7 6		scars. 2 1 0
(LB) SCORE (RB) 9. Vegetative	Right Bank 10 9 More than 90% of the	8 7 6 8 7 6 70-90% of the streambank	5 4 3 50-70% of the streambank	2 1 0
(LB) SCORE (RB) 9. Vegetative Protection	Right Bank 10 9 More than 90% of the streambank surfaces and	8 7 6 8 7 6 70-90% of the streambank surfaces covered by native	5 4 3 50-70% of the streambank surfaces covered by	2 1 0 Less than 50% of the streambank surfaces covered
(LB) SCORE (RB) 9. Vegetative	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone	8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption	2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of
(LB) SCORE (RB) 9. Vegetative Protection	Right Bank 10 9 More than 90% of the streambank surfaces and	8 7 6 8 7 6 70-90% of the streambank surfaces covered by native	5 4 3 50-70% of the streambank surfaces covered by	2 1 0 Less than 50% of the streambank surfaces covered
(LB) SCORE (RB) 9. Vegetative Protection	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody	8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half	2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5
(LB) SCORE (RB) 9. Vegetative Protection	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative	8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble	2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average
(LB) SCORE (RB) 9. Vegetative Protection	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or	8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half	2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5
(LB) SCORE (RB) 9. Vegetative Protection	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative	8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble	2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average
(LB) SCORE (RB) 9. Vegetative Protection (score each bank)	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
(LB) SCORE (RB) 9. Vegetative Protection (score each bank)	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants	8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble	2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average
(LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB)	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9	8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
(LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
(LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB)	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9 Right Bank 10 9	8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 8 7 6	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 2 1 0
(LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9	8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 8 7 6 Width of riparian zone 12-18 meters; human activities have	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
(LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB) 10. Riparian Vegetative Zone Width (score each bank riparian	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9 Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-	8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 8 7 6 Width of riparian zone 12-18 meters; human activities have impacted zone only	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 5 4 3 Width of riparian zone 6-12	2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 Width of riparian zone <6 meters; little or no riparian vegetation due to human
(LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB) 10. Riparian Vegetative Zone Width (score	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9 Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not	8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 8 7 6 Width of riparian zone 12-18 meters; human activities have	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 5 4 3 Width of riparian zone 6-12 meters; human activities has	2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 Width of riparian zone <6 meters; little or no riparian
(LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB) 10. Riparian Vegetative Zone Width (score each bank riparian zone).	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9 Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not impacted zone	8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 8 7 6 Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 5 4 3 Width of riparian zone 6-12 meters; human activities has inpacted zone a great deal.	2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
(LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB) 10. Riparian Vegetative Zone Width (score each bank riparian zone).	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9 Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not	8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 8 7 6 Width of riparian zone 12-18 meters; human activities have impacted zone only	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 5 4 3 Width of riparian zone 6-12 meters; human activities has	2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 Width of riparian zone <6 meters; little or no riparian vegetation due to human
(LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB) 10. Riparian Vegetative Zone Width (score each bank riparian zone).	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9 Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not impacted zone	8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 8 7 6 Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 5 4 3 Width of riparian zone 6-12 meters; human activities has inpacted zone a great deal.	2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.

STREAM NAME: P	-1DS (Williams C	'reek)	LOC	ATION:	Warden Waste Site-lov	ver end	of site near Rt 69
STATION: WP719	DRAINAGE A	AREA (AC)	BASI	IN/WATERSHI	ED Green River	:/Willian	ns Creek
LAT: 37-24-09.6	LONG:	87-03-43.8	COU	NTY; O	hio USGS 7.5 T	OPO;	Equality
DATE: 2/20/14	ΓΙΜΕ: <i>9:00</i> ET	□AM ☑ PM	INVI	ESTIGATORS;	John Bottom/Bi	ll Samps	son
TYPE SAMPLE: P-C	HEM Macı	oinvertebrate		BACT.			
WEATHER: No		24 hours			rain in the last 7 days?	? Snow	
		eavy rain	□Yes	✓No			
		eady rain	Air tempe	rature 50	F. Inches rainfa	ll in pas	st 24 hours 0.1 in
☐ Clear ☑		ermittent showers ear/sunny	<u>100</u> %	Cloud Cover			
P-Chem: Temp (°F)		(mg/l)	% Saturation	pH(5	S.U.) Cond.		263.0 □ Grab
INSTREAM WATERSH							
FEATURES St. W. M. FOW		OCAL WATERS					
Stream Width EOW Stream Width BF	5.0 ft P	redominant Surrou Surface Minin		e: Construct	ion 🗹 Fore	e t	
Stream Bottom Width	3.0 ft		g	Commerc		sı ure/Graz	zinα
Avg. Bankfull Depth	1.5 ft	1 0		☐ Industrial		culture	zing
Avg. H ² O Depth Riffle	0.3 ft			□ Row Crop			ff/Storm Sewers
					· 	1. TT	n
Hydraulic Structures: ☐ Dams ☐	Bridge Abutme		ream Flow; Poole	ed 🗖 Low		Stream T Z Pere	ennial Intermittent
	Waterfalls	nts ☐ Dry ☐ Hig		Rapid or Torre			nemeral Seep
	Culverts		,	Tupid of Tolle			John John John John John John John John
Riparian Vegetation:		Dom. Tree/Shru	ıh Taxa	Canopy Cove	wt.	Chan	nnel Alterations;
Dominate Type:		Sugar maple	io runu		aposed (0-25%)		Dredging
✓ Trees ✓	Shrubs	Beech			Exposed (25-50%)		Channelization
	Herbaceous	Hophornbeam			Shaded (50-75%)		(☑ Full □ Partial)
Number of Strata .	3	Swamp chestnu	t oak	☐ Fully Sh	aded (75-100%)		
Substrate ☑ Est. ☐	P.C	Riffle5	%	Run;	5 %	Pool	90 %
Silt/Clay (<0.06 mm)		90	9		90		100
Sand (0.06-2 mm)							
Gravel (2-64 mm)		10	9		10		
Cobble (64-256 mm)							
Boulders (>256 mm) Bedrock							
Habitat				Condition C	atagary		
Parameter	Ont	imal	Subor	otimal	Marginal		Poor
		0% of substrate		f stable habitat;	10-30% mix of stable h	abitat;	Less than 10-% stable
1. Epifaunal	favorable f	or epifaunal	well suited	for full	habitat availability less	s than	habitat" lack of habitat is
Substrate/		d fish cover; mix	colonization	potential;	desirable; substrate freq	uently	obvious; substrate unstable
Available		ubmerged logs,	-	habitat for	disturbed or removed.		or lacking.
Cover		cobble or other and at stage to	maintenance of	of populations; f additional			
		nization potential	1	e form of new			
		that are <u>not</u> new		et prepared for			
	fall and not trans		colonization	(may rate at			
ggopp	20 10	10 15 14	high end of sca			_	
SCORE		18 17 16		13 12 11		6 cand	5 4 3 2 1 0
2. Pool Substrate/	with gravel	ostrate materials, and firm sand		t sand, mud, or y be dominant;	All mud or clay or bottom; little or no roo		Hard-pan clay or bedrock; no root mat or vegetation.
Characterization	prevalent; ro		some root	mats and	no submerged vegetation		no root mut of vogetation.
	submerged vege		submerged	vegetation			
			present.				
SCORE		18 17 16		13 12 11		6	5 4 3 2 1 0
		ge shallow, large-		ols large-deep;	Shallow poors much		Majority of pools small-
3. Pool Availability		llow, small-deep	very few shallo	ow.	prevalent than deep pool	S.	shallow or pools absent.
ggopp	pools present.					_	
SCORE	20 19	18 17 16	15 14	13 12 11	10 9 8 7	6	5 4 3 2 1 0

	Little or no enlargement of	Some new increase in bar	Moderate deposition of new	Heavy despoits of fine
4. Sediment Deposition	islands or point bars and less	formation, mostly from	gravel, sand or fine sediment	material, increased bar
	than 20% of the bottom affected by sediment	gravel, sand or fine sediment; 20-50% of the bottom	on old and new bars; 50-80% of the bottom affected;	development; 80% of the bottom changing frequently;
	deposition.	affected; slight deposition in	sediment deposits at	pools almost absent due to
	deposition.	pools.	obstructions, constrictions,	substantial sediment
		F	and bends; moderate	deposition.
			deposition of pools prevalent.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both	Water fills > 75% of the	Waar fills 25-75% of the	Very little water in channel
	lower banks, and minimal	available channel; or <25%	available channel, and/or	and mostly present as
	amount of channel substrate is exposed.	of channel substrate is exposed.	riffle substrates are mostly exposed.	standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging	Some channelization present,	Channelization may be	Banks shored with gabion of
	absent or minimal; stream with	usually in areas of bridge	extensive; embankments or	cement; over 80% of the
	normal pattern.	abutments; evidence of past	shoring structures present on	stream reach channelized and
		channelization, i.e., dredging,	both banks; and 40-80% of	disrupted. Instream habitat
		(greater than past 20 yr.) may	stream reach channelized and	greatly altered or removed
		be present, but recent channelization is not present.	disrupted.	entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream	The bends in the stream	The bends in the stream	Channel straight; waterway
	increase the stream length 3-4	increase the stream length	increase the stream length 2-	has been channelized for a
	times longer than if it was a	2-3 times longer than if it	1 times longer than if it was	long distance.
	straight line. (Note – channel	was in a straight line.	in a straight line.	
	braiding is considered normal in coastal plains and other			
	low-lying areas. This			
	parameter is not easily rated in			
	these areas.			
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent	Moderately stable, infrequent, small areas of	Moderately unstable, 30-60% of bank in reach has areas of	Unstable, many eroded areas, "raw" areas frequently along
	or minimal; little potential for	erosion mostly healed over.	erosion, high erosion	straight sections and bends;
	future problems. <5% of bank	5-30% of bank in reach has	potential during floods.	obvious bank sloughing; 60-
	affected.	areas of erosion.	_	100% of bank has erosional
SCORE	Left Bank 10 9	8 7 6	5 4 3	scars. 2 1 0
(LB)	Left Bank 10 9	8 / 6	3 4 3	2 1 0
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)				
9. Vegetative	More than 90% of the	70-90% of the streambank	50-70% of the streambank	Less than 50% of the
Protection	streambank surfaces and	surfaces covered by native	surfaces covered by	
(score each bank)	immediate riparian zone	vegetation, but one class of	vegetation; disruption	by vegetation; disruptive of
	covered by native vegetation, including trees, understory	plants is not well- represented; disruption	obvious; patches of bare soil or closely cropped vegetation	streambank vegetation is very high; vegetation has
	shrubs, or nonwoody	evident but not affecting full	common; less than one-half	been removed to 5
	macrophytes; vegetative	plant growth potential to any	of the potential plant stubble	centimeters or less in average
	disruption through grazing or	great extent; more than one-	height remaining.	stubble height.
	mowing minimal or not	half of the potential plant		
	evident; almost all plants	stubble height remaining.		
SCORE	allowed to grow naturally. Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB)	Lett Dank 10 /	, , ,		
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)				
10. Riparian Vegetative	Width of riparian zone > 18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6
Zone Width (score	meters; human activities (i.e.,	meters; human activities have	meters; human activities has	meters; little or no riparian
each bank riparian zone).	parking lots, roadbeds, clear- cuts, lawns, or crops) have not	impacted zone only minimally.	inpacted zone a great deal.	vegetation due to human activities.
Lone).	impacted zone			delivities.
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB)				
SCORE	Right Bank 10 9	8 7 (6)	5 4 3	2 1 0
(RB)				

BASIN/WATERSHED Green River/Williams Creek LAT: 37-23-58.9 LONG: 87-03-48.0 COUNTY; Ohio USGS 7.5 TOPO; Equality DATE: 2/18/14 FIME: 2:21 ET DAM MPM INVESTIGATORS; John Bottom/Bill Sampson TYPE SAMPLE: P-CHEM Macroinvertebrate FISH BACT. WEATHER: Now Past 24 hours Has there been a heavy rain in the last 7 days? Snow Heavy rain Yes No Air temperature 54 °F. Inches rainfall in past 24 hours 0.24 in MIntermittent showers Clear County
DATE: 2/18/14
TYPE SAMPLE: P-CHEM Macroinvertebrate FISH BACT. WEATHER: Now Past 24 hours Has there been a heavy rain in the last 7 days? Snow Heavy rain Yes No Steady rain Air temperature 54 °F. Inches rainfall in past 24 hours 0.24 in
WEATHER: Now Past 24 hours Has there been a heavy rain in the last 7 days? Snow Heavy rain Yes No Air temperature 15 % Cloud Cover Has there been a heavy rain in the last 7 days? Snow F. Inches rainfall in past 24 hours 0.24 in
☐ Heavy rain ☐ Yes ☑ No ☐ Steady rain Air temperature 54 °F. Inches rainfall in past 24 hours 0.24 in ☐ ☑ Intermittent showers 15 % Cloud Cover
☐ Steady rain Air temperature 54 °F. Inches rainfall in past 24 hours 0.24 in ☐ Intermittent showers 15 % Cloud Cover
☐ ☐ Intermittent showers <u>15</u> % Cloud Cover
Cicui Cicui Sumi
P-Chem: Temp (°F) <u>42.4</u> D.O. (mg/l) % Saturation pH(S.U.) Cond. <u>431.0</u> Grab
INSTREAM WATERSHED
FEATURES LOCAL WATERSHED FEATURES:
Stream Width EOW 5.6 ft Predominant Surrounding Land Use:
Stream Width BF 10.0 ft Surface Mining Construction Forest Commercial Pasture/Grazing
Avg. Bankfull Depth 1-1.5 ft Oil Wells Industrial Silviculture
Avg. H ² O Depth Riffle 0.35 ft \square Land Disposal \square Row Crops \square Urban Runoff/Storm Sewers
Hydraulic Structures: Stream Flow; Stream Type; □ Dams □ Bridge Abutments □ Dry □ Pooled □ Low □ Normal ☑ Perennial □ Intermittent
☐ Island ☐ Waterfalls ☐ High ☐ Very Rapid or Torrential ☐ Ephemeral ☐ Seep
□ Other □ Culverts
Riparian Vegetation: Dom. Tree/Shrub Taxa Canopy Cover; Channel Alterations;
Dominate Type: Sugarberry Fully Exposed (0-25%) Dredging
✓ Trees ✓ Shrubs <i>Redcedar</i> □ Partially Exposed (25-50%) □ Channelization
☐ Grasses ☑ Herbaceous Blackgum ☑ Partially Shaded (50-75%) (☐ Full ☐ Partial)
Number of Strata 3 Red oak \square Fully Shaded (75-100%)
Pin oak
Substrate Est. P.C Riffle % Run ; 60 % Pool 40 %
Silt/Clay (<0.06 mm)
Gravel (2-64 mm) 40 40
Cobble (64-256 mm)
Boulders (>256 mm)
Bedrock
Habitat Condition Category
Parameter Optimal Suboptimal Marginal Poor
Greater than 50% of substrate 30-50% mix of stable habitat; 10-30% mix of stable habitat; Less than 10-% stable favorable for epifaunal well suited for full habitat availability less than habitat lack of habitat is
Substrate/ colonization and fish cover; mix colonization potential; desirable; substrate frequently obvious; substrate unstable
Available of snags, submerged logs, adequate habitat for disturbed or removed. or lacking.
Cover undercut banks, cobble or other maintenance of populations;
stable habitat and at stage to presence of additional
allow full colonization potential substrate in the form of new (i.e., logs/snags that are <u>not</u> new fall, but not yet prepared for
fall and <u>not</u> transient.
high end of scale).
SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Mixture of substrate materials, Mixture of soft sand, mud, or All mud or clay or sand Hard-pan clay or bedrock; 2. Pool Substrate/ with gravel and firm sand clay; mud may be dominant; bottom; little or no root mat; no root mat or vegetation.
2. Pool Substrate/ with gravel and firm sand clay; mud may be dominant; bottom; little or no root mat; no root mat or vegetation. Characterization prevalent; root mats and some root mats and no submerged vegetation.
submerged vegetation common. submerged vegetation
present.
SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Even mix of large shallow, large- Majority of pools large-deep; Shallow pools much more Majority of pools small-
deep, small-shallow, small-deep very few shallow. pools present.
SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

4. Sediment Deposition	Little or no enlargement of islands or point bars and less	Some new increase in bar formation, mostly from	Moderate deposition of new gravel, sand or fine sediment	Heavy despoits of fine material, increased bar
4. Sediment Deposition	than 20% of the bottom	gravel, sand or fine sediment;	on old and new bars; 50-80%	development; 80% of the
	affected by sediment	20-50% of the bottom	of the bottom affected;	bottom changing frequently;
	deposition.	affected; slight deposition in	sediment deposits at	pools almost absent due to
		pools.	obstructions, constrictions,	substantial sediment
			and bends; moderate deposition of pools prevalent.	deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both	Water fills > 75% of the	Water fills 25.3% of the	Very little water in channel
	lower banks, and minimal amount of channel substrate is	available channel; or <25% of channel substrate is	available channel, and/or riffle substrates are mostly	and mostly present as standing pools.
	exposed.	exposed.	exposed.	standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging	Some channelization present,	Channelization may be	Banks shored with gabion of
	absent or minimal; stream with normal pattern.	usually in areas of bridge abutments; evidence of past	extensive; embankments or shoring structures present on	cement; over 80% of the stream reach channelized and
	normai pattern.	channelization, i.e., dredging,	both banks; and 40-80% of	disrupted. Instream habitat
		(greater than past 20 yr.) may	stream reach channelized and	greatly altered or removed
		be present, but recent	disrupted.	entirely.
SCORE	20 19 18 17 16	channelization is not present.	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream	The bends in the stream	The bends in the stream	Channel straight; waterway
-	increase the stream length 3-4	increase the stream length	increase the stream length 2-	has been channelized for a
	times longer than if it was a straight line. (Note – channel	2-3 times longer than if it was in a straight line.	1 times longer than if it was in a straight line.	long distance.
	braiding is considered normal	was in a straight line.	in a straight fine.	
	in coastal plains and other			
	low-lying areas. This			
	parameter is not easily rated in these areas.			
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of	Moderately stable,	Moderately unstable, 30-60%	Unstable, many eroded areas,
	erosion or bank failure absent or minimal; little potential for	infrequent, small areas of erosion mostly healed over.	of bank in reach has areas of erosion, high erosion	"raw" areas frequently along straight sections and bends;
	future problems. <5% of bank	5-30% of bank in reach has	potential during floods.	obvious bank sloughing; 60-
	affected.	areas of erosion.		100% of bank has erosional
SCORE	Left Bank 10 9	8 7 6	5 4 3	scars. 2 1 0
(LB)				
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)	More than 000/ of the	70 000/ of the streamhants	50.700/ of the streamborts	Loss than 500/ of the
9. Vegetative Protection	More than 90% of the streambank surfaces and	70-90% of the streambank surfaces covered by native	50-70% of the streambank surfaces covered by	Less than 50% of the streambank surfaces covered
(score each bank)	immediate riparian zone	vegetation, but one class of	vegetation; disruption	by vegetation; disruptive of
	covered by native vegetation,	plants is not well-	obvious; patches of bare soil	streambank vegetation is
	including trees, understory shrubs, or nonwoody	represented; disruption evident but not affecting full	or closely cropped vegetation common; less than one-half	very high; vegetation has been removed to 5
	macrophytes; vegetative	plant growth potential to any	of the potential plant stubble	centimeters or less in average
	disruption through grazing or	great extent; more than one-	height remaining.	stubble height.
	mowing minimal or not evident; almost all plants	half of the potential plant stubble height remaining.		
	allowed to grow naturally.	stubble height remaining.		
SCORE	Left Bank 10 9	8 7 6	5 (4) 3	2 1 0
(LB)	D1.14 B 1 40 0	0 7 .		2 4 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative	Width of riparian zone > 18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6
Zone Width (score	meters; human activities (i.e.,	meters; human activities have	meters; human activities has	meters; little or no riparian
each bank riparian	parking lots, roadbeds, clear-	impacted zone only	inpacted zone a great deal.	vegetation due to human
zone).	cuts, lawns, or crops) have not impacted zone	minimally.		activities.
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB)	Did British Co.			
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(ND)]	l		l

STREAM NAME: P	-2 DS		LOC	ATION:	Warden Waste Site-sou	ıthwest	corner of site near Rt 69
STATION: WP473	DRAINAGE A	AREA (AC)	BAS	IN/WATERSHI	ED <i>Green River</i>	·/Williar	ms Creek
LAT: 37-23-55.2	LONG:	87-03-43.2	COU	NTY; O	hio USGS 7.5 T	OPO;	Equality
DATE: 2/18/14	ΓΙΜΕ: <i>1:18</i> ΕΤ	INVI	INVESTIGATORS; John Bottom/Bill Sampson				
TYPE SAMPLE: P-C	HEM 🔲 Macı	roinvertebrate	🗖 FISH 🔲 l	BACT.			
WEATHER: No		24 hours			rain in the last 7 days?	? Snow	
		eavy rain	□Yes	✓No			
		eady rain	Air tempe	rature <u>52</u>	_ °F. Inches rainfa	ll in pas	st 24 hours 0.24 in
☐ Clear ☑		ermittent showers ear/sunny	%	Cloud Cover			
P-Chem: Temp (°F)	43.9 D.O.	(mg/l)	% Saturation	pH(\$	S.U.) Cond.	5	508.0 □ Grab
INSTREAM WATERSH							
FEATURES		OCAL WATERS					
Stream Width EOW Stream Width BF	6-7 ft Pr	redominant Surrou Surface Mining		e: Construct	tion Z Fore	ct	
Stream Bottom Width	1.5 ft		5	□ Commerc		are/Graz	zinσ
Avg. Bankfull Depth	1.5 ft [☐ Industrial		culture	
Avg. H ² O Depth Riffle	0.4 ft	Land Disposal		Row Cro	ps 🔲 Urba	ın Runo	off/Storm Sewers
Hydraulic Structures:			ream Flow;			Stream 7	Tuna
•	Bridge Abutme			ed 🗖 Low			rennial Intermittent
	Waterfalls	Hig ☑ Hig	,	Rapid or Torre			nemeral Seep
☐ Other ☐	Culverts		•	•		•	•
Riparian Vegetation:		Dom. Tree/Shru	ıb Taxa	Canopy Cove	er;	Char	nnel Alterations;
Dominate Type:		Sweetgum	Maple		xposed (0-25%)		Dredging
✓ Trees ✓	Shrubs	Walnut	Sugarberry	☐ Partially	Exposed (25-50%)		Channelization
	Herbaceous	American elm	Blackgum		Shaded (50-75%)		(Partial)
Number of Strata	<u> </u>	Redcedar		☐ Fully Sh	naded (75-100%)		
		Red oak					
	P.C	Riffle	%	Run;	40 %	Pool	
Silt/Clay (<0.06 mm) Sand (0.06-2 mm)					85 10		85 10
Gravel (2-64 mm)		1			5		
Cobble (64-256 mm)					<i>J</i>		<u> </u>
Boulders (>256 mm)							
Bedrock							
Habitat			1	Condition C			
Parameter		imal		ptimal	Marginal		Poor
1. Epifaunal		0% of substrate for epifaunal	well suited	f stable habitat; for full	10-30% mix of stable habitat availability less		Less than 10-% stable habitat" lack of habitat is
1. Epifaunal Substrate/		fish cover; mix	colonization	potential;	desirable; substrate freq		obvious; substrate unstable
Available		ubmerged logs,		habitat for	disturbed or removed.	[]	or lacking.
Cover		cobble or other		of populations;			
		and at stage to	presence o				
		nization potential that are <u>not</u> new		e form of new et prepared for			
	fall and not trans			(may rate at			
			high end of sca				
SCORE		18 17 16		13 12 11		6	5 4 3 2 1 0
2. Pool Substrate/		ostrate materials,		t sand, mud, or	All mud or clay or		Hard-pan clay or bedrock;
2. Pool Substrate/ Characterization	with gravel a		some root	y be dominant; mats and	bottom; little or no roo no submerged vegetation		no root mat or vegetation.
Characterization	submerged vege		submerged	vegetation	no buomergen vegenation	••	
present.							
SCORE	20 19	18 17 16	15 14	13 12 11	10 8 7	6	5 4 3 2 1 0
		ge shallow, large-		ools large-deep;	Shallow poors much	-	Majority of pools small-
3. Pool Availability		llow, small-deep	very few shall	ow.	prevalent than deep pool		shallow or pools absent.
SCORE	20 19	18 17 16	15 14	13 12 11	10 9 8 7	6	5 4 3 2 1 0
•			-	-			

	Little or no enlargement of	Some new increase in bar	Moderate deposition of new	Heavy despoits of fine
4. Sediment Deposition	islands or point bars and less	formation, mostly from	gravel, sand or fine sediment	material, increased bar
	than 20% of the bottom affected by sediment	gravel, sand or fine sediment; 20-50% of the bottom	on old and new bars; 50-80% of the bottom affected;	development; 80% of the bottom changing frequently;
	deposition.	affected; slight deposition in	sediment deposits at	pools almost absent due to
	deposition.	pools.	obstructions, constrictions,	substantial sediment
		Poolsi	and bends; moderate	deposition.
			deposition of pools prevalent.	1
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both	Water fills > 75% of the	Water 25-75% of the	Very little water in channel
	lower banks, and minimal	available channel; or <25%	available channel, and/or	and mostly present as
	amount of channel substrate is	of channel substrate is	riffle substrates are mostly	standing pools.
SCORE	exposed. 20 19 18 17 16	e posed. 15 14 13 12 11	exposed. 10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging	Some channelization present,	Channelization may be	Banks shored with gabion of
o. Chamier / Interation	absent or minimal; stream with	usually in areas of bridge	extensive; embankments or	cement; over 80% of the
	normal pattern.	abutments; evidence of past	shoring structures present on	stream reach channelized and
	_	channelization, i.e., dredging,	both banks; and 40-80% of	disrupted. Instream habitat
		(greater than past 20 yr.) may	stream reach channelized and	greatly altered or removed
		be present, but recent	disrupted.	entirely.
SCORE	20 10 10 17 17	channelization is not present.	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	20 19 18 17 16 The bends in the stream	15 14 13 12 11 The bends in the stream	The bends in the stream	5 4 3 2 1 0 Channel straight; waterway
7. Chamici Sinuosity	increase the stream length 3-4	increase the stream length	increase the stream length 2-	has been channelized for a
	times longer than if it was a	2-3 times longer than if it	1 times longer than if it was	long distance.
	straight line. (Note - channel	was in a straight line.	in a straight line.	
	braiding is considered normal			
	in coastal plains and other			
	low-lying areas. This			
	parameter is not easily rated in these areas.			
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of	Moderately stable,	Moderately unstable, 30-60%	Unstable, many eroded areas,
	erosion or bank failure absent	infrequent, small areas of	of bank in reach has areas of	"raw" areas frequently along
	or minimal; little potential for	erosion mostly healed over. 5-30% of bank in reach has	erosion, high erosion	straight sections and bends;
	future problems. <5% of bank affected.	areas of erosion.	potential during floods.	obvious bank sloughing; 60- 100% of bank has erosional
	urrected.	areas of crosion.		scars.
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB)				
SCORE	Right Bank 10 9	8 7 6	5 (4) 3	2 1 0
(RB)	36 1 000/ 6 1	70.000/ 6.1	50.700/ 6 1	7 1 500/ 6 1
9. Vegetative Protection	More than 90% of the streambank surfaces and	70-90% of the streambank surfaces covered by native	50-70% of the streambank surfaces covered by	Less than 50% of the streambank surfaces covered
(score each bank)	immediate riparian zone	vegetation, but one class of	vegetation; disruption	by vegetation; disruptive of
(score each bank)	covered by native vegetation,	plants is not well-	obvious; patches of bare soil	streambank vegetation is
	including trees, understory	represented; disruption	or closely cropped vegetation	very high; vegetation has
	shrubs, or nonwoody	evident but not affecting full	common; less than one-half	been removed to 5
	macrophytes; vegetative	plant growth potential to any	of the potential plant stubble	centimeters or less in average
	disruption through grazing or mowing minimal or not	great extent; more than one- half of the potential plant	height remaining.	stubble height.
	evident; almost all plants	stubble height remaining.		
	allowed to grow naturally.	stasoic neight remaining.		
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB)				
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)	TT' 1.1 C 1 1 1 1 1 1	XX' 1.1 . 0 . 1	William Color	Wild C
10. Riparian Vegetative	Width of riparian zone > 18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6
Zone Width (score each bank riparian	meters; human activities (i.e., parking lots, roadbeds, clear-	meters; human activities have impacted zone only	meters; human activities has inpacted zone a great deal.	meters; little or no riparian vegetation due to human
zone).	cuts, lawns, or crops) have not	minimally.	mpacion zone a great utai.	activities.
	impacted zone			
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB)				
SCORE	Right Bank 10 9	8 7 6	5 4 (3)	2 1 0
(RB))	

STREAM NAME: I-	6		LOCA	ATION:	Warden Waste Site		
STATION: WP 634	DRAINAGE A	AREA (AC)	BASI	N/WATERSHI	ED Green River	·/Williar	ms Creek
LAT: 37-24-18.6	LONG:	87-03-46.2	COU	NTY; O	hio USGS 7.5 T	OPO;	Equality
DATE: 2/19/14	ΓΙΜΕ: <i>12:49</i> ΕΤ	INVE	INVESTIGATORS; John Bottom/Bill Sampson				
TYPE SAMPLE: P-CI				BACT.	Volum Bollomy Br	it Samp.	
WEATHER: No		24 hours			rain in the last 7 days	? Snow	
		avy rain	□Yes	✓No			
□ □ Clear ☑	□ Steady rain Air temperature $\underline{50}$ °F. Inches rainfall in past 24 hours $\underline{0.1}$ in $\underline{\square}$ Intermittent showers $\underline{15}$ % Cloud Cover						
P-Chem: Temp (°F)	43.9 D.O.	(mg/l)	% Saturation	pH(\$	S.U.) Cond	6	551.0
INSTREAM WATERSH	ED						
FEATURES		OCAL WATERS	_				
Stream Width EOW		redominant Surrou					
Stream Width BF Stream Bottom Width	10.0 ft 2.0 ft L	•	g	□ Construct □ Commerce		st ure/Graz	zina
Avg. Bankfull Depth	.75-1 ft L			□ Industrial		culture	
Avg. H ² O Depth Riffle	0.1 ft			Row Crop			off/Storm Sewers
Hydraulic Structures:	L 75 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -		ream Flow;			Stream 7	
	Bridge Abutme Waterfalls	nts □ Dry ☑ Hig		ed		Per Epl	ennial
	Culverts	▼ File	ıı 🗖 very	Kapiu or Torre	iitiai	L Epi	iemerai 🗖 Seep
		Dom. Tree/Shru	h Torro	Canopy Cove		Char	nnel Alterations;
Riparian Vegetation: Dominate Type:		Sycamore	ib Taxa		er; aposed (0-25%)		Dredging
✓ Trees ✓	Shrubs	Swamp chestnu	t oak		Exposed (25-50%)		Channelization
☐ Grasses ☑	Herbaceous	Pinoak			Shaded (50-75%)	l l	(☑ Full □ Partial)
Number of Strata	3	Red maple		✓ Fully Sh	aded (75-100%)		
		Sugar maple					
Substrate Est.	P.C	Riffle 10) %	Run;	10 %	Pool	80 %
Silt/Clay (<0.06 mm)		90)		90		90
Sand (0.06-2 mm)		10)		10		10
Gravel (2-64 mm)							
Cobble (64-256 mm)							
Boulders (>256 mm) Bedrock						+	
Habitat				Condition C	ategory	1	
Parameter	Ont	imal	Subop		Marginal		Poor
		0% of substrate	30-50% mix of		10-30% mix of stable h	abitat;	Less than 10-% stable
1. Epifaunal		or epifaunal	well suited		habitat availability les		habitat" lack of habitat is
Substrate/		l fish cover; mix	colonization	potential;	desirable; substrate free	uently	obvious; substrate unstable
Available Cover		ibmerged logs, cobble or other	adequate l maintenance o	nabitat for	disturbed or removed.		or lacking.
20.01		and at stage to	presence of				
	allow full color	nization potential	substrate in the				
		that are <u>not</u> new	fall, but not ye				
	fall and not trans	sient.	colonization (
SCORE	20 19	18 17 16	high end of sca	13 12 11	10 9 8 7	6	5 4 3 2 1 0
		ostrate materials,	Mixture of soft		All mud or clay or		Hard-pan clay or bedrock;
2. Pool Substrate/	with gravel		clay; mud may	be dominant;	bottom; little or no roo		no root mat or vegetation.
Characterization	prevalent; ro		some root	mats and	no submerged vegetation	1.	
	submerged vege	tation common.	submerged present.	vegetation			
SCORE		18 17 16		13 12 11		6	5 4 3 2 1 0
3. Pool Availability		ge shallow, large- llow, small-deep	Majority of po- very few shallo		Shallow pools much prevalent than deep pool		Majority of pools small-shallow or pools absent.
SCORE		18 17 16	15 14 1	13 12 11	10 9 8 7	6	5 4 3 2 1 0
SCORE	2 0 17 .	1/ 10	10 14 1	14 11	10 / 0 /	v	7 J 4 1 U

	Little or no enlargement of	Some new increase in bar	Moderate deposition of new	Heavy despoits of fine
4. Sediment Deposition	islands or point bars and less	formation, mostly from	gravel, sand or fine sediment	material, increased bar
	than 20% of the bottom	gravel, sand or fine sediment;	on old and new bars; 50-80%	development; 80% of the
	affected by sediment	20-50% of the bottom	of the bottom affected; sediment deposits at	bottom changing frequently;
	deposition.	affected; slight deposition in pools.	sediment deposits at obstructions, constrictions,	pools almost absent due to substantial sediment
		pools.	and bends; moderate	deposition.
			deposition of pools prevalent.	deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both	Water $911 > 75\%$ of the	Water fills 25-75% of the	Very little water in channel
	lower banks, and minimal	available channel; or <25%	available channel, and/or	and mostly present as
	amount of channel substrate is	of channel substrate is	riffle substrates are mostly	standing pools.
	exposed.	exposed.	exposed.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging	Some channelization present,	Channelization may be	Banks shored with gabion of
	absent or minimal; stream with	usually in areas of bridge	extensive; embankments or	cement; over 80% of the stream reach channelized and
	normal pattern.	abutments; evidence of past channelization, i.e., dredging,	shoring structures present on both banks; and 40-80% of	disrupted. Instream habitat
		(greater than past 20 yr.) may	stream reach channelized and	greatly altered or removed
		be present, but recent	disrupted.	entirely.
		channelization is not present.	disrapted.	charery.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream	The bends in the stream	The bends in the stream	Channel straight; waterway
	increase the stream length 3-4	increase the stream length	increase the stream length 2-	has been channelized for a
	times longer than if it was a	2-3 times longer than if it	1 times longer than if it was	long distance.
	straight line. (Note – channel	was in a straight line.	in a straight line.	
	braiding is considered normal			
	in coastal plains and other			
	low-lying areas. This parameter is not easily rated in			
	these areas.			
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
0 Dowl- Cr-1-11	Banks stable; evidence of			Unstable, many eroded areas,
8. Bank Stability	Banks stable; evidence of	Moderately stable,	Moderately unstable, 30-60%	Unstable, many eroded areas,
o. Bank Stability	erosion or bank failure absent	infrequent, small areas of	of bank in reach has areas of	"raw" areas frequently along
o. Bank Stability	erosion or bank failure absent or minimal; little potential for	infrequent, small areas of erosion mostly healed over.	of bank in reach has areas of erosion, high erosion	"raw" areas frequently along straight sections and bends;
o. Bank Stability	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has	of bank in reach has areas of	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-
o. Bank Stability	erosion or bank failure absent or minimal; little potential for	infrequent, small areas of erosion mostly healed over.	of bank in reach has areas of erosion, high erosion	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional
	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	of bank in reach has areas of erosion, high erosion potential during floods.	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.
SCORE	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has	of bank in reach has areas of erosion, high erosion	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional
	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	of bank in reach has areas of erosion, high erosion potential during floods.	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.
SCORE (LB)	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	of bank in reach has areas of erosion, high erosion potential during floods.	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0
SCORE (LB) SCORE	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	of bank in reach has areas of erosion, high erosion potential during floods.	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0
SCORE (LB) SCORE (RB) 9. Vegetative Protection	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 70-90% of the streambank surfaces covered by native	of bank in reach has areas of erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered
SCORE (LB) SCORE (RB) 9. Vegetative	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of	of bank in reach has areas of erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of
SCORE (LB) SCORE (RB) 9. Vegetative Protection	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation,	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-	of bank in reach has areas of erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is
SCORE (LB) SCORE (RB) 9. Vegetative Protection	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption	of bank in reach has areas of erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has
SCORE (LB) SCORE (RB) 9. Vegetative Protection	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full	of bank in reach has areas of erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5
SCORE (LB) SCORE (RB) 9. Vegetative Protection	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any	of bank in reach has areas of erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average
SCORE (LB) SCORE (RB) 9. Vegetative Protection	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-	of bank in reach has areas of erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5
SCORE (LB) SCORE (RB) 9. Vegetative Protection	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any	of bank in reach has areas of erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average
SCORE (LB) SCORE (RB) 9. Vegetative Protection (score each bank)	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	of bank in reach has areas of erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average
SCORE (LB) SCORE (RB) 9. Vegetative Protection (score each bank)	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant	of bank in reach has areas of erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average
SCORE (LB) SCORE (RB) 9. Vegetative Protection (score each bank)	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	of bank in reach has areas of erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	of bank in reach has areas of erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB)	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9 Right Bank 10 9	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6	of bank in reach has areas of erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 2 1 0
SCORE (LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB) 10. Riparian Vegetative	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9 Right Bank 10 9	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 Width of riparian zone 12-18	of bank in reach has areas of erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 5 4 3 Width of riparian zone 6-12	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 Width of riparian zone <6
SCORE (LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB) 10. Riparian Vegetative Zone Width (score	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9 Right Bank 10 9 Width of riparian zone > 18 meters; human activities (i.e.,	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 Width of riparian zone 12-18 meters; human activities have	of bank in reach has areas of erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 5 4 3 Width of riparian zone 6-12 meters; human activities has	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 Width of riparian zone <6 meters; little or no riparian
SCORE (LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB) 10. Riparian Vegetative Zone Width (score each bank riparian	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9 Right Bank 10 9 Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 Width of riparian zone 12-18 meters; human activities have impacted zone only	of bank in reach has areas of erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 5 4 3 Width of riparian zone 6-12	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 Width of riparian zone <6 meters; little or no riparian vegetation due to human
SCORE (LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB) 10. Riparian Vegetative Zone Width (score	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9 Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 Width of riparian zone 12-18 meters; human activities have	of bank in reach has areas of erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 5 4 3 Width of riparian zone 6-12 meters; human activities has	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 Width of riparian zone <6 meters; little or no riparian
SCORE (LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB) 10. Riparian Vegetative Zone Width (score each bank riparian	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9 Right Bank 10 9 Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not impacted zone	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 Width of riparian zone 12-18 meters; human activities have impacted zone only	of bank in reach has areas of erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 5 4 3 Width of riparian zone 6-12 meters; human activities has	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 Width of riparian zone <6 meters; little or no riparian vegetation due to human
SCORE (LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB) 10. Riparian Vegetative Zone Width (score each bank riparian zone).	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9 Right Bank 10 9 Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not impacted zone	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	of bank in reach has areas of erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 5 4 3 Width of riparian zone 6-12 meters; human activities has inpacted zone a great deal.	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB) SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB) 10. Riparian Vegetative Zone Width (score each bank riparian zone).	erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. Left Bank 10 9 Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9 Right Bank 10 9 Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not impacted zone	infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. 8 7 6 8 7 6 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	of bank in reach has areas of erosion, high erosion potential during floods. 5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 5 4 3 Width of riparian zone 6-12 meters; human activities has inpacted zone a great deal.	"raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. 2 1 0 Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.

STREAM NAME: I-	7		LOC	ATION:	Warden Waste Site		
STATION: WP 555	DRAINAGE A	AREA (AC)	BASI	N/WATERSHI	ED <i>Green Rive</i>	r/Williaı	ms Creek
LAT: 37-23-54.0	LONG:	87-03-46.6	COU	NTY; O	hio USGS 7.5	ГОРО;	Equality
DATE: 2/19/14	ΓΙΜΕ: <i>8:40</i> ΕΤ	INVI	INVESTIGATORS; John Bottom/Bill Sampson				
TYPE SAMPLE: P-CI			□ BACT.				
WEATHER: No	w Past 2	24 hours	Has there	been a heavy	rain in the last 7 days	? Snow	
<u> </u>		eavy rain	□Yes	✓No			
□ □ Clear ☑	□ Steady rain Air temperature 40 °F. Inches rainfall in past 24 hours 0.1 in □ Intermittent showers 15 % Cloud Cover						
P-Chem: Temp (°F)	37.0 D.O.	(mg/l)	% Saturation	pH(S	S.U.) Cond	. <u>1</u>	191.0
INSTREAM WATERSH	ED						
FEATURES St. Wild FOW		OCAL WATERS	-				
Stream Width EOW Stream Width BF	$\frac{4.0}{10.0}$ ft Pr	redominant Surrou Surface Mining		e: Construct	tion I Fore	et	
Stream Bottom Width	1.0 ft		5	Commerc		ure/Gra	zing
Avg. Bankfull Depth	0.75 ft			■ Industrial		iculture	C
Avg. H ² O Depth Riffle	0.3 ft	Land Disposal		☐ Row Crop	ps 🔲 Urb	an Runo	off/Storm Sewers
Hydraulic Structures:		C+	ream Flow;			Stream 7	Tuna
	Bridge Abutme			ed 🗖 Low		□ Per	
	Waterfalls	III.5		Rapid or Torre			hemeral Seep
□ Other □	Culverts			•		•	•
Riparian Vegetation:		Dom. Tree/Shru	ıb Taxa	Canopy Cove			nnel Alterations;
Dominate Type:		Sycamore			xposed (0-25%)		Dredging
☑ Trees ☑	Shrubs	Redcedar			Exposed (25-50%)		Channelization
☐ Grasses ☑ Number of Strata	Herbaceous	Pinoak Cottonwood			Shaded (50-75%) aded (75-100%)		(☑ Full □ Partial)
Number of Strata	<u> </u>	Collonwood		L Fully Sil	laded (73-100%)		
	P.C	Riffle	%	Run;	100 %	Pool	%
Silt/Clay (<0.06 mm)					100		
Sand (0.06-2 mm) Gravel (2-64 mm)						-	
Cobble (64-256 mm)		1				+	
Boulders (>256 mm)							
Bedrock		1					
Habitat				Condition C	ategory		
Parameter		imal	Subor		Marginal		Poor
1. Epifaunal		0% of substrate or epifaunal	30-50% mix of well suited	stable habitat; for full	10-30% mix of stable habitat availability les		Less than 10-% stable habitat" lack of habitat is
Substrate/		fish cover; mix	colonization	potential;	desirable; substrate fre		obvious; substrate unstable
Available		ubmerged logs,		habitat for	disturbed or removed.	1	or lacking.
Cover		cobble or other		of populations;			
		and at stage to nization potential	presence of	f additional e form of new			
		that are <u>not</u> new		et prepared for			
	fall and not trans			(may rate at	_		
			high end of sca				
SCORE		18 17 16		13 12 11		6	5 4 3 2 1 0
2. Pool Substrate/	with gravel	ostrate materials, and firm sand	Mixture of sof clay; mud may		All mud or clay or bottom; little or no ro		Hard-pan clay or bedrock; no root mat or vegetation.
Characterization	prevalent; roo		some root	mats and	no submerged vegetatio		no root mut or vegetation.
submerged vegetation common. submerged vegetation							
present.							
SCORE		18 17 16		13 12 11	10 9 8 7	6	5 4 3 2 1 0
		ge shallow, large-	Majority of po		Shallow pools much		Majority of pools small-
3. Pool Availability	deep, small-sha pools present.	llow, small-deep	very few shallo	ow.	prevalent than deep poo	ls.	shallow or pools absent.
CCOPE		10 15 15	4.5.1.	10 10 11	10.0.0.=		
SCORE	20 19	18 17 16	15 14 1	13 12 11	10 9 8 7	6	5 4 3 2 1 0

		1		
	Little or no enlargement of	Some new increase in bar	Moderate deposition of new	Heavy despoits of fine
4. Sediment Deposition	islands or point bars and less	formation, mostly from	gravel, sand or fine sediment	material, increased bar
	than 20% of the bottom affected by sediment	gravel, sand or fine sediment; 20-50% of the bottom	on old and new bars; 50-80% of the bottom affected;	development; 80% of the bottom changing frequently;
	deposition.	affected; slight deposition in	sediment deposits at	pools almost absent due to
	deposition.	pools.	obstructions, constrictions,	substantial sediment
		F	and bends; moderate	deposition.
			deposition of pools prevalent.	1
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of bean	Water fills > 75% of the	Water fills 25-75% of the	Very little water in channel
	lower banks, and minimal	available channel; or <25%	available channel, and/or	and mostly present as
	amount of channel substrate is exposed.	of channel substrate is exposed.	riffle substrates are mostly exposed.	standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging	Some channelization present,	Channelization may be	Banks shored with gabion of
	absent or minimal; stream with	usually in areas of bridge	extensive; embankments or	cement; over 80% of the
	normal pattern.	abutments; evidence of past	shoring structures present on	stream reach channelized and
		channelization, i.e., dredging,	both banks; and 40-80% of	disrupted. Instream habitat
		(greater than past 20 yr.) may	stream reach channelized and	greatly altered or removed
		be present, but recent channelization is not present.	disrupted.	entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream	The bends in the stream	The bends in the stream	Channel straight; waterway
	increase the stream length 3-4	increase the stream length	increase the stream length 2-	has been channelized for a
	times longer than if it was a	2-3 times longer than if it	1 times longer than if it was	long distance.
	straight line. (Note – channel	was in a straight line.	in a straight line.	
	braiding is considered normal in coastal plains and other			
	low-lying areas. This			
	parameter is not easily rated in			
	these areas.			
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of	Moderately stable,	Moderately unstable, 30-60%	Unstable, many eroded areas,
	erosion or bank failure absent or minimal; little potential for	infrequent, small areas of erosion mostly healed over.	of bank in reach has areas of erosion, high erosion	"raw" areas frequently along straight sections and bends;
	future problems. <5% of bank	5-30% of bank in reach has	potential during floods.	obvious bank sloughing; 60-
	affected.	areas of erosion.	F	100% of bank has erosional
				scars.
SCORE	Left Bank 10 (9)	8 7 6	5 4 3	
L (T.D.)	Left Balik 10 3			2 1 0
(LB)		9 7 4		
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9		5 4 3	2 1 0
SCORE		8 7 6 70-90% of the streambank surfaces covered by native		2 1 0 Less than 50% of the
SCORE (RB) 9. Vegetative	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone	70-90% of the streambank	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption	Less than 50% of the streambank surfaces covered by vegetation; disruptive of
SCORE (RB) 9. Vegetative Protection	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation,	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is
SCORE (RB) 9. Vegetative Protection	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well- represented; disruption	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has
SCORE (RB) 9. Vegetative Protection	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5
SCORE (RB) 9. Vegetative Protection	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average
SCORE (RB) 9. Vegetative Protection	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5
SCORE (RB) 9. Vegetative Protection	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average
9. Vegetative Protection (score each bank)	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (RB) 9. Vegetative Protection (score each bank) SCORE	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average
SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB)	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally Left Bank 10 9	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB)	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally Left Bank 10 9 Right Bank 10 9	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 8 7 6	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 2 1 0
SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB) 10. Riparian Vegetative Zone Width (score	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally Left Bank 10 9 Right Bank 10 9 Width of riparian zone > 18 meters; human activities (i.e.,	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 8 7 6 Width of riparian zone 12-18 meters; human activities have	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 5 4 3 Width of riparian zone 6-12 meters; human activities has	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 Width of riparian zone <6 meters; little or no riparian
SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB) 10. Riparian Vegetative Zone Width (score each bank riparian	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally Left Bank 10 9 Right Bank 10 9 Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 Width of riparian zone 12-18 meters; human activities have impacted zone only	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 5 4 3 Width of riparian zone 6-12	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 Width of riparian zone <6 meters; little or no riparian vegetation due to human
SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB) 10. Riparian Vegetative Zone Width (score	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9 Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 8 7 6 Width of riparian zone 12-18 meters; human activities have	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 5 4 3 Width of riparian zone 6-12 meters; human activities has	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 Width of riparian zone <6 meters; little or no riparian
SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB) 10. Riparian Vegetative Zone Width (score each bank riparian zone).	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9 Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not impacted zone	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 5 4 3 Width of riparian zone 6-12 meters; human activities has inpacted zone a great deal.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB) 10. Riparian Vegetative Zone Width (score each bank riparian zone).	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9 Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 Width of riparian zone 12-18 meters; human activities have impacted zone only	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 5 4 3 Width of riparian zone 6-12 meters; human activities has	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 Width of riparian zone <6 meters; little or no riparian vegetation due to human
SCORE (RB) 9. Vegetative Protection (score each bank) SCORE (LB) SCORE (RB) 10. Riparian Vegetative Zone Width (score each bank riparian zone).	Right Bank 10 9 More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. Left Bank 10 9 Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not impacted zone	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 8 7 6 Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	5 4 3 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 5 4 3 Width of riparian zone 6-12 meters; human activities has inpacted zone a great deal.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. 2 1 0 Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.

STREAM NAME: I-o	8US		LOCA	ATION:	Warden Waste Site		
STATION: WP 210	DRAINAGE A	AREA (AC)	BASI	N/WATERSHI	ED Green Ri	ver/Willia	ms Creek
LAT: 37-24-14.7	LONG:	87-03-35.8			hio USGS 7.		Equality
DATE: 3/10/14	ΓΙΜΕ: 6:15 ET	□AM ☑☑Pì	M INVE	ESTIGATORS;	John Bottom	/Rill Samn	ison
TYPE SAMPLE: P-CI				BACT.	John Bollom	ът затр	son
WEATHER: No	w Past 2	24 hours	Has there	been a heavy	rain in the last 7 da	ys? <i>Snow</i>	
		eavy rain	□Yes	✓No			
	□ □ Steady rain Air temperature $\underline{63}$ °F. Inches rainfall in past 24 hours $\underline{0.0}$ in □ □ Intermittent showers $\underline{0}$ % Cloud Cover						
Clear ✓							
P-Chem: Temp (°F)		(mg/l)	% Saturation _	pH(S	S.U.) Co	nd. <u>4</u>	417
INSTREAM WATERSHI		OCAT WARREN		DE G			
FEATURES Stream Width EOW		OCAL WATERS redominant Surrou					
Stream Width BF	3.0 ft			c: ☐ Construct	ion 🗹 F	orest	
Stream Bottom Width	0.5 ft		ь	Commerc		asture/Gra	zing
Avg. Bankfull Depth	0.75 ft 	1 0		■ Industrial		ilviculture	
Avg. H ² O Depth Riffle	<i>0.1</i> ft □	Land Disposal		☐ Row Crop	os 🔲 U	rban Runc	off/Storm Sewers
Hydraulic Structures:			ream Flow;			Stream 7	Typa
•	Bridge Abutme			d 🗖 Low	✓ Normal		rennial Intermittent
	Waterfalls	Hig		Rapid or Torre			hemeral Seep
	Culverts		,				
Riparian Vegetation:		Dom. Tree/Shru	ıb Taxa	Canopy Cove	er:	Chai	nnel Alterations;
Dominate Type:		Red maple			posed (0-25%)		Dredging
✓ Trees ✓	Shrubs	Pinoak			Exposed (25-50%)		Channelization
	Herbaceous	Redceadar			Shaded (50-75%)		(☑ Full □ Partial)
Number of Strata 3	<u> </u>	Sycamore		☑ Fully Sh	aded (75-100%)		
		Beech					
	P.C	Riffle 20		Run;	20 %	Pool	
Silt/Clay (<0.06 mm)		90			90		90
Sand (0.06-2 mm)		10)		10		10
Gravel (2-64 mm) Cobble (64-256 mm)							
Boulders (>256 mm)							
Bedrock							
Habitat		,1		Condition C	ategory	l .	
Parameter		timal	Subor		Marginal		Poor
		0% of substrate	30-50% mix of		10-30% mix of stabl		Less than 10-% stable
1. Epifaunal Substrate/		for epifaunal d fish cover; mix	well suited colonization	for full potential;	habitat availability desirable; substrate f		habitat" lack of habitat is obvious; substrate unstable
Available		ubmerged logs,		nabitat for	disturbed or removed		or lacking.
Cover		, cobble or other	maintenance o				8
		and at stage to	presence of				
		nization potential	substrate in the				
	fall and not trans	that are <u>not</u> new	fall, but not ye colonization (
	ran and <u>not</u> trans	sicit.	high end of sca				
SCORE	20 19	18 17 16		3 12 11	10 9 8 7	6	5 4 3 2 1 0
		ostrate materials,	Mixture of soft		All mud or clay		Hard-pan clay or bedrock;
2. Pool Substrate/	with gravel		clay; mud may		bottom; little or no		no root mat or vegetation.
Characterization	prevalent; roo submerged vege		some root submerged	mats and vegetation	no submerged vegeta	IOII.	
	Sacmerged vege	cation common.	present.	, ogetation			
SCORE	20 10	10 17 17	•	3 12 11	10 0 0 7	6	5 4 2 2 1 0
SCURE		18 17 16 ge shallow, large-	15 14 1 Majority of po		10 9 8 7 Shallow pools mu		5 4 3 2 1 0 Majority of pools small-
3. Pool Availability	deep, small-sha	illow, small-deep	very few shallo		prevalent than deep p		shallow or pools absent.
	pools present.						
SCORE	20 19	18 17 16	15 14 1	3 12 11	10 9 8 7	6	5 4 3 2 1 0

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate	Heavy despoits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
			deposition of pools prevalent.	deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of bear lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent clannelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was a straight line. (Note – channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2-1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)	Right Bank 10 9	° (′)°	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities has inpacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
	l.	l		

STREAM NAME: I-o	8DS		LOC	ATION:	Warden Waste Site		
STATION: WP 765	DRAINAGE A	AREA (AC)	BASI	N/WATERSHI	ED <i>Green Rive</i>	r/Willia	ms Creek
LAT: 37-24-06.0	LONG:	87-03-37.9			hio USGS 7.5		Equality
DATE: 2/20/14	ΓΙΜΕ: <i>10:49</i> ΕΤ	☑ AM □PM	INVE	ESTIGATORS;	John Bottom/B	ill Samn	noson
TYPE SAMPLE: P-CI				BACT.	John Bonon, B	и эшпр	SOL
WEATHER: No		24 hours			rain in the last 7 days	? Snow	,
		eavy rain eady rain	☐Yes Air temper	✓No	°F. Inches rainf	all in no	st 24 hours 0.1 in
□ Clouds ☑	✓Inte	ermittent showers		Cloud Cover	1. Inches faint	an m pa	st 24 hours <u>0.1</u> hi
P-Chem: Temp (°F)		-	% Saturation	pH(S	S.U.) Cond	l. <u>.</u>	317 □ Grab
INSTREAM WATERSH							
FEATURES Straam Width FOW		OCAL WATERS					
Stream Width EOW Stream Width BF	1.5-2 ft Pr 8.0 ft C	redominant Surrou Surface Mining		e: Construct	tion 🗹 For	est	
Stream Bottom Width	1.0 ft		5	Commerc		ure/Gra	zing
Avg. Bankfull Depth	0.5 ft	1 0		☐ Industrial		iculture	
Avg. H ² O Depth Riffle	<u>0.1</u> ft □	Land Disposal		☐ Row Crop	ps 🔲 Urb	an Runc	off/Storm Sewers
Hydraulic Structures:		St	ream Flow;			Stream 7	Tyne:
•	Bridge Abutme			ed 🗖 Low			rennial Intermittent
☐ Island ☐	Waterfalls	☑ Hig	gh 🔲 Very	Rapid or Torre	ntial	□ Epl	hemeral Seep
□ Other □	Culverts						
Riparian Vegetation:		Dom. Tree/Shru		Canopy Cove			nnel Alterations;
Dominate Type:	CI I	Spicebush	Maple		sposed (0-25%)		Dredging
✓ Trees ✓ Grasses	Shrubs Herbaceous	Pinoak Sugarberry			Exposed (25-50%) Shaded (50-75%)		Channelization (✓ Full □ Partial)
Number of Strata		Sycamore			aded (75-100%)		
	<u> </u>	Swamp chestnut	t oak				
Substrate ☑ Est. □	l P.C	Riffle	%	Run;	90 %	Pool	1 10 %
Silt/Clay (<0.06 mm)					100		100
Sand (0.06-2 mm)							
Gravel (2-64 mm)							
Cobble (64-256 mm)							
Boulders (>256 mm)							
Bedrock Habitat	1			Condition C	la4aaa		
Parameter	Onf	timal	Subor	Condition C	Marginal		Poor
1 at affect		0% of substrate	30-50% mix of		10-30% mix of stable	habitat:	Less than 10-% stable
1. Epifaunal		or epifaunal	well suited		habitat availability les		habitat" lack of habitat is
Substrate/		d fish cover; mix	colonization	potential;	desirable; substrate fre	quently	obvious; substrate unstable
Available Cover		ubmerged logs, cobble or other	-	nabitat for	disturbed or removed.		or lacking.
Cover		and at stage to	maintenance of				
		nization potential	substrate in the				
		that are <u>not</u> new		et prepared for			
	fall and not trans	sient.		(may rate at			
SCORE	20 19	18 17 16	high end of sea	13 12 11	10 9 8 7	6	5 4 3 2 1 0
DO THE		ostrate materials,	Mixture of sof		All mud or clay o		Hard-pan clay or bedrock;
2. Pool Substrate/	with gravel	and firm sand	clay; mud may		bottom; little or no ro	ot mat;	no root mat or vegetation.
Characterization	prevalent; roo		some root	mats and	no submerged vegetation	n.	
	submerged vege	tation common.	submerged present.	vegetation			
99955		12	•	\Box			
SCORE		18 17 16		13 12 11	10 9 8 7	<u>6</u>	5 4 3 2 1 0
3. Pool Availability		ge shallow, large- llow, small-deep	Majority of po very few shallo		Shallow pools much prevalent than deep pool		Majority of pools small- shallow or pools absent.
5. 1 ooi 11 variatimity	pools present.	, sinan-ucep	, or j row sname		Prevalent than deep poo		or poors absent.
SCORE	20 19	18 17 16	15 14 1	13 12 11	10 9 8 7	6	3 4 3 2 1 0
						_	

	Little or no enlargement of	Some new increase in bar	Moderate deposition of new	Heavy despoits of fine
4. Sediment Deposition	islands or point bars and less	formation, mostly from	gravel, sand or fine sediment	material, increased bar
	than 20% of the bottom	gravel, sand or fine sediment;	on old and new bars; 50-80%	development; 80% of the
	affected by sediment	20-50% of the bottom	of the bottom affected;	bottom changing frequently;
	deposition.	affected; slight deposition in	sediment deposits at	pools almost absent due to
		pools.	obstructions, constrictions, and bends; moderate	substantial sediment deposition.
			deposition of pools prevalent.	deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Flow Status	Water reaches base of both	Water fills 5% of the	Water fills 25-75% of the	Very little water in channel
	lower banks, and minimal	available channel; or <25%	available channel, and/or	and mostly present as
	amount of channel substrate is	of channel substrate is	riffle substrates are mostly	standing pools.
	exposed.	exposed.	exposed.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging	Some channelization present,	Channelization may be	Banks shored with gabion of
	absent or minimal; stream with	usually in areas of bridge	extensive; embankments or	cement; over 80% of the
	normal pattern.	abutments; evidence of past	shoring structures present on	stream reach channelized and
		channelization, i.e., dredging,	both banks; and 40-80% of	disrupted. Instream habitat
		(greater than past 20 yr.) may be present, but recent	stream reach channelized and disrupted.	greatly altered or removed entirely.
		channelization is not resent.	disrupted.	entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream	The bends in the stream	The bends in the stream	Channel straight; waterway
	increase the stream length 3-4	increase the stream length	increase the stream length 2-	has been channelized for a
	times longer than if it was a	2-3 times longer than if it	1 times longer than if it was	long distance.
	straight line. (Note - channel	was in a straight line.	in a straight line.	_
	braiding is considered normal			
	in coastal plains and other			
	low-lying areas. This			
	parameter is not easily rated in			
SCORE	these areas. 20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of	Moderately stable,	Moderately unstable, 30-60%	Unstable, many eroded areas,
or Built Builting	erosion or bank failure absent	infrequent, small areas of	of bank in reach has areas of	"raw" areas frequently along
	or minimal; little potential for	erosion mostly healed over.	erosion, high erosion	straight sections and bends;
	future problems. <5% of bank	5-30% of bank in reach has	potential during floods.	obvious bank sloughing; 60-
	affected.	areas of erosion.		100% of bank has erosional
CCOPE	Let Devil 10 0		5 4 2	scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)				
9. Vegetative	More than 90% of the	70-90% of the streambank	50-70% of the streambank	Less than 50% of the
Protection	streambank surfaces and		surfaces covered by	
(score each bank)	immediate riparian zone	vegetation, but one class of	vegetation; disruption	by vegetation; disruptive of
	covered by native vegetation,	plants is not well-	obvious; patches of bare soil	streambank vegetation is
	including trees, understory	represented; disruption	or closely cropped vegetation	very high; vegetation has
	shrubs, or nonwoody	evident but not affecting full	common; less than one-half	been removed to 5
	macrophytes; vegetative disruption through grazing or	plant growth potential to any great extent; more than one-	of the potential plant stubble	centimeters or less in average
	mowing minimal or not	half of the potential plant	height remaining.	stubble height.
	evident; almost all plants	stubble height remaining.		
	allowed to grow naturally.	states are seen remaining.		
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB)				
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)				
10. Riparian Vegetative	Width of riparian zone > 18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6
Zone Width (score	meters; human activities (i.e.,	meters; human activities have	meters; human activities has	meters; little or no riparian
each bank riparian	parking lots, roadbeds, clear-	impacted zone only	inpacted zone a great deal.	vegetation due to human
zone).	cuts, lawns, or crops) have not	minimally.		activities.
GGODE	impacted zone			
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB) SCORE	Dight Donly 10 0	2 7	5 4 2	2 1 0
(RB)	Right Bank 10 9	8 (7) 6	5 4 3	2 1 0
	İ		Ī	İ

STREAM NAME: I-9	9		LOCA	ATION:	Warden Waste S	ite	
STATION: WP 273	DRAINAGE A	AREA (AC)	BASI	N/WATERSHI	ED <i>Green</i>	River/Willian	ms Creek
LAT: 37-24-04.4	LONG:	87-03-28.0	COU	NTY; O	hio USGS	7.5 TOPO;	Equality
DATE: 3/11/14	ГІМЕ: <i>11:34</i> ЕТ	☑ AM □ PM	INVE	ESTIGATORS;	John Bott	om/Bill Samp.	son
TYPE SAMPLE: P-CI	HEM Macr	oinvertebrate	■ FISH ■ E	BACT.			
WEATHER: No	w Past 2	24 hours	Has there	been a heavy	rain in the last 7	days? Snow	
		avy rain	□Yes	✓No			
		eady rain	Air temper		_ °F. Inches	rainfall in pas	st 24 hours $\underline{0.0}$ in
☐ Clear ☑		ermittent showers ear/sunny		Cloud Cover			
P-Chem: Temp (°F)		(mg/l)	% Saturation _	pH(S	S.U.)	Cond. <u>1</u>	<u>111.9</u> □ Grab
INSTREAM WATERSHI							
FEATURES		OCAL WATERS	_				
Stream Width EOW Stream Width BF		redominant Surrou			: 7	E	
Stream Bottom Width	$\frac{3.5-4}{1.0}$ ft		g	ConstructCommerce	-	Forest Pasture/Graz	zina
Avg. Bankfull Depth	0.5 ft			☐ Industrial		Silviculture	zing
Avg. H ² O Depth Riffle	0.1 ft			Row Crop			off/Storm Sewers
					_		
Hydraulic Structures:	Duides Abouton	_	ream Flow;	.a. 🗖 T	N1	Stream 7	
	Bridge Abutmer Waterfalls	nts □ Dry ☑ Hig		ed 🔲 Low Rapid or Torrei			ennial
	Culverts	rig	ıı 🗖 very	Kapid of Toffer	iitiai	L Epi	iemerai 🗖 Seep
	Curverts	Dom. Tree/Shru	1 T			CI	1 414 4
Riparian Vegetation: Dominate Type:		Red maple	ib Taxa	Canopy Cove	er; eposed (0-25%)		nnel Alterations; Dredging
✓ Trees ✓	Shrubs	Pinoak			Exposed (25-50%)		Channelization
☐ Grasses ☑	Herbaceous	Sweetgum			Shaded (50-75%)	,	(Full Partial)
Number of Strata 3	3	Sycamore			aded (75-100%)		
_							
Substrate ☑ Est. □	P.C	Riffle	5 %	Run;	10 %	Pool	70 %
Silt/Clay (<0.06 mm)		100	0	<u> </u>	100		100
Sand (0.06-2 mm)			•				
Gravel (2-64 mm)							
Cobble (64-256 mm)							
Boulders (>256 mm)							
Bedrock	T	<u> </u>		G 1111 G	1.4		
Habitat Parameter	Ont	imal	Subor	Condition C	ategory Margin	ad.	Poor
1 at afficter		0% of substrate	30-50% mix of		10-30% mix of st		Less than 10-% stable
1. Epifaunal		or epifaunal	well suited		habitat availabilit		habitat" lack of habitat is
Substrate/	colonization and	fish cover; mix	colonization	potential;	desirable; substrat	e frequently	obvious; substrate unstable
Available		ibmerged logs,	-	nabitat for	disturbed or remov	ved.	or lacking.
Cover		cobble or other	maintenance of				
		and at stage to nization potential	presence of substrate in the				
		that are <u>not</u> new	fall, but not ye				
	fall and <u>not</u> trans		colonization ((may rate at			
			high end of sca	ile).			
SCORE		18 17 16		13 12 11	10 9 8	7 6	5 4 3 2 1 0
2 P1 C-1 + + /		ostrate materials,	Mixture of soft		All mud or cla		Hard-pan clay or bedrock;
2. Pool Substrate/ Characterization	with gravel a prevalent; roo		clay; mud may some root	mats and	bottom; little or no submerged veg		no root mat or vegetation.
Characterization	submerged veget		submerged	vegetation	no submerged veg	ciation.	
			present.				
SCORE	20 19 1	18 17 16	15 14 1	13 12 11	10 9 8	7 6	5 4 3 2 1 0
		ge shallow, large-	Majority of po		Shallow pools		Majority of pools small-
3. Pool Availability	deep, small-shall	llow, small-deep	very few shallo		prevalent than dee		shallow or pools absent.
	pools present.				()		
SCORE	20 19 1	18 17 16	15 14 1	13 12 11	10 9 8	7 6	5 4 3 2 1 0

_				
	Little or no enlargement of	Some new increase in bar	Moderate deposition of new	Heavy despoits of fine
4. Sediment Deposition	islands or point bars and less	formation, mostly from	gravel, sand or fine sediment	material, increased bar
	than 20% of the bottom	gravel, sand or fine sediment;	on old and new bars; 50-80%	development; 80% of the
	affected by sediment	20-50% of the bottom	of the bottom affected; sediment deposits at	bottom changing frequently;
	deposition.	affected; slight deposition in pools.	sediment deposits at obstructions, constrictions,	pools almost absent due to substantial sediment
		pools.	and bends; moderate	deposition.
			deposition of pools prevalent.	deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both	Water fills > \ of the	Water fills 25-75% of the	Very little water in channel
	lower banks, and minimal	available channel; or <25%	available channel, and/or	and mostly present as
	amount of channel substrate is	of channel substrate is	riffle substrates are mostly	standing pools.
	exposed.	exposed.	exposed.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging	Some channelization present,	Channelization may be	Banks shored with gabion of
	absent or minimal; stream with	usually in areas of bridge	extensive; embankments or	cement; over 80% of the
	normal pattern.	abutments; evidence of past channelization, i.e., dredging,	shoring structures present on both banks; and 40-80% of	stream reach channelized and disrupted. Instream habitat
		(greater than past 20 yr.) may	stream reach channelized and	greatly altered or removed
		be present, but recent	disrupted.	entirely.
		channe azas on is not present.		
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream	The bends in the stream	The bends in the stream	Channel straight; waterway
	increase the stream length 3-4	increase the stream length	increase the stream length 2-	has been channelized for a
	times longer than if it was a	2-3 times longer than if it	1 times longer than if it was	long distance.
	straight line. (Note – channel	was in a straight line.	in a straight line.	
	braiding is considered normal in coastal plains and other			
	low-lying areas. This			
	parameter is not easily rated in			
	these areas.			
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of	Moderately stable,	Moderately unstable, 30-60%	Unstable, many eroded areas,
	erosion or bank failure absent	infrequent, small areas of	of bank in reach has areas of	"raw" areas frequently along
	or minimal; little potential for	erosion mostly healed over. 5-30% of bank in reach has	erosion, high erosion	straight sections and bends;
	future problems. <5% of bank affected.	areas of erosion.	potential during floods.	obvious bank sloughing; 60- 100% of bank has erosional
	arrected.	areas of crosion.		scars.
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB)				
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)				
9. Vegetative	More than 90% of the	70-90% of the streambank	50-70% of the streambank	Less than 50% of the
Protection	streambank surfaces and	surfaces covered by native	surfaces covered by	
(score each bank)	immediate riparian zone covered by native vegetation,	vegetation, but one class of plants is not well-	vegetation; disruption obvious; patches of bare soil	by vegetation; disruptive of streambank vegetation is
	including trees, understory	represented; disruption	or closely cropped vegetation	very high; vegetation has
	shrubs, or nonwoody	evident but not affecting full	common; less than one-half	been removed to 5
	macrophytes; vegetative	plant growth potential to any	of the potential plant stubble	centimeters or less in average
	disruption through grazing or	great extent; more than one-	height remaining.	stubble height.
	mowing minimal or not	half of the potential plant		
	evident; almost all plants	stubble height remaining.		
SCORE	allowed to grow naturally. Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB)	Left Balik 10 9	° '	3 4 3	
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)				
10. Riparian Vegetative	Width of riparian zone > 18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6
Zone Width (score	meters; human activities (i.e.,	meters; human activities have	meters; human activities has	meters; little or no riparian
each bank riparian	parking lots, roadbeds, clear-	impacted zone only	inpacted zone a great deal.	vegetation due to human
zone).	cuts, lawns, or crops) have not	minimally.		activities.
CCOPE	impacted zone		5 4 2	2 1 0
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)	Night Dank 10			2 1 V
· /	ı		i .	

STREAM NAME: E-	37		LOC	ATION:	Warden Waste S	ite	
STATION: WP 562	DRAINAGE AREA (AC	2)	BAS	IN/WATERSHI	ED <i>Green</i>	n River/Willia	ums Creek
LAT: 37-24-25.6	LONG: 87-03-	45.7	COU	NTY; O	hio USGS	5 7.5 TOPO;	Equality
DATE: 2/19/14	ГІМЕ: <i>10:26</i> ЕТ □АМ	☑ PM	INVI	ESTIGATORS;	John Bott	om/Bill Samp	pson
TYPE SAMPLE: P-CF				BACT.			
WEATHER: Nov	w Past 24 hours	Н	as there	been a heavy	rain in the last 7	days? Snow	v
	Heavy rain		Yes	✓No		•	
	Steady rain	A	ir tempe	rature 45	F. Inches	rainfall in pa	ast 24 hours 0.1 in
□ Clear ☑	<u> </u>						
P-Chem: Temp (°F)		% Satu	ration	pH(\$	S.U.)	Cond	☐ Grab NA
INSTREAM WATERSHI							
FEATURES		ATERSHED					
Stream Width EOW		Surrounding	Land Us			Esusat	
Stream Width BF Stream Bottom Width		Mining		Construct	-	Forest	
Avg. Bankfull Depth	$\begin{array}{c cccc} \underline{2.5} & \text{ft} & \square & \text{Deep M} \\ \hline 1.0 & \text{ft} & \square & \text{Oil We} \\ \end{array}$			☐ Commercial		Pasture/Gra Silviculture	
Avg. H ² O Depth Riffle	ft Land D			Row Crop			off/Storm Sewers
		•		L Kow Crop	ρs		
Hydraulic Structures:	_	Stream F		_	_	Stream	
	Bridge Abutments	-					rennial Intermittent
	Waterfalls	1 High	Very	Rapid or Torres	ntıal	☑ Ep	ohemeral
	Culverts			T = =			
Riparian Vegetation:		ee/Shrub Taxa		Canopy Cove			annel Alterations;
Dominate Type:	Pinoak				sposed (0-25%)		Dredging
✓ Trees ✓ Grasses	Shrubs Swamp of Herbaceous Blackgun	hestnut oak			Exposed (25-50% Shaded (50-75%))	Channelization (✓ Full ☐ Partial)
Number of Strata 3		п			aded (75-100%)		(Full Falual)
- Number of Strata	<u> </u>			La Tuny Sh	adda (75-10070)		
	P.C Riffle		%	Run;	%	Poo	
Silt/Clay (<0.06 mm) Sand (0.06-2 mm)				1			100
Gravel (2-64 mm)							
Cobble (64-256 mm)							
Boulders (>256 mm)							
Bedrock							
Habitat				Condition C	ategory		
Parameter	Optimal		Subo	ptimal	Margii	nal	Poor
	Greater than 50% of sub	ostrate 30-50		f stable habitat;	10-30% mix of s	table habitat;	Less than 10-% stable
1. Epifaunal		faunal well	suited		habitat availabili		habitat" lack of habitat is
Substrate/	colonization and fish cover		ization	potential;	desirable; substra		obvious; substrate unstable
Available Cover	of snags, submerged undercut banks, cobble or			habitat for of populations;	disturbed or remo	veu.	or lacking.
COVEI	stable habitat and at sta						
	allow full colonization po			e form of new			
	(i.e., logs/snags that are no			et prepared for			
	fall and not transient.			(may rate at			
GGODE	40 40 40 47		en i of se		10 0 0		
SCORE		16 15		13 12 11	10 9 8	7 6	5 4 3 2 1 0
2. Pool Substrate/	Mixture of substrate mat with gravel and firm			t sand, mud, or y be dominant;	All mud or cl bottom; little or		Hard-pan clay or bedrock; no root mat or vegetation.
Characterization	prevalent; root mats	and some	root	mats and	no submerged veg		no root mat or vegetation.
	submerged vegetation comm			vegetation	11 11 11 11 11 11 11 11 11 11 11 11 11	,	
		prese	_				
SCORE	20 19 18 17	16 15	14	13 12 11	10 9 8	7 6	5 4 3 2 1 0
	Even mix of large shallow,			ools large-deep;	Shallow pools		Majority of pools small-
3. Pool Availability	deep, small-shallow, small		ew shallo		prevalent than dee		shallow or pools absent.
	pools present.						
SCORE	20 19 18 17	16 15	14	13 12 11	10 9 8	7 6	5 4 3 2 1 0

4. Sediment Deposition	Little or no enlargement of islands or point bars and less	Some new increase in bar formation, mostly from	Moderate deposition of new gravel, sand or fine sediment	Heavy despoits of fine material, increased bar
_	than 20% of the bottom	gravel, sand or fine sediment;	on old and new bars; 50-80%	development; 80% of the
	affected by sediment	20-50% of the bottom	of the bottom affected;	bottom changing frequently;
	deposition.	affected; slight deposition in	sediment deposits at	pools almost absent due to
		pools.	obstructions, constrictions,	substantial sediment
			and bends; moderate	deposition.
			deposition of pools prevalent.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of bear	Water fills > 75% of the	Water fills 25-75% of the	Very little water in channel
	lower banks, and minimal	available channel; or <25%	available channel, and/or	and mostly present as
	amount of channel substrate is exposed.	of channel substrate is exposed.	riffle substrates are mostly exposed.	standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging	Some channelization present,	Channelization may be	Banks shored with gabion of
o. Chamici Atteration	absent or minimal; stream with	usually in areas of bridge	extensive; embankments or	cement; over 80% of the
	normal pattern.	abutments; evidence of past	shoring structures present on	stream reach channelized and
	normal patterns	channelization, i.e., dredging,	both banks; and 40-80% of	disrupted. Instream habitat
		(greater than past 20 yr.) may	stream reach channelized and	greatly altered or removed
		be present, but recent	disrupted.	entirely.
		channelization is not present.		
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream	The bends in the stream	The bends in the stream	Channel straight; waterway
	increase the stream length 3-4	increase the stream length	increase the stream length 2-	has been channelized for a
	times longer than if it was a	2-3 times longer than if it	1 times longer than if it was	long distance.
	straight line. (Note – channel	was in a straight line.	in a straight line.	
	braiding is considered normal			
	in coastal plains and other			
	low-lying areas. This parameter is not easily rated in			
	these areas.			
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of	Moderately stable,	Moderately unstable, 30-60%	Unstable, many eroded areas,
, and the second	erosion or bank failure absent	infrequent, small areas of	of bank in reach has areas of	"raw" areas frequently along
	or minimal; little potential for	erosion mostly healed over.	erosion, high erosion	straight sections and bends;
	future problems. <5% of bank	5-30% of bank in reach has	potential during floods.	obvious bank sloughing; 60-
	affected.	areas of erosion.		100% of bank has erosional
SCORE	Left Bank 10 9	8 7 6	5 4 3	scars. 2 1 0
(LB)				2 1 0
SCORE	Right Bank 10 9	8 (7) 6	5 4 3	2 1 0
(RB)				
9. Vegetative	More than 90% of the	70-90% of the streambank	50-70% of the streambank	Less than 50% of the
Protection	streambank surfaces and	I		
(score each bank)	immediate riparian zone	vegetation, but one class of	vegetation; disruption	by vegetation; disruptive of
	covered by native vegetation, including trees, understory	plants is not well- represented; disruption	obvious; patches of bare soil or closely cropped vegetation	streambank vegetation is very high; vegetation has
	shrubs, or nonwoody	evident but not affecting full	common; less than one-half	been removed to 5
	macrophytes; vegetative	plant growth potential to any	of the potential plant stubble	centimeters or less in average
	disruption through grazing or	great extent; more than one-	height remaining.	stubble height.
	mowing minimal or not	half of the potential plant		
	evident; almost all plants	stubble height remaining.		
	allowed to grow naturally.			
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB)				
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)				
10. Riparian Vegetative	Width of riparian zone > 18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6
Zone Width (score	meters; human activities (i.e.,	meters; human activities have	meters; human activities has	meters; little or no riparian
each bank riparian	parking lots, roadbeds, clear-	impacted zone only	inpacted zone a great deal.	vegetation due to human
zone).	cuts, lawns, or crops) have not impacted zone	minimally.		activities.
	I IIIII ACTAA ZONA	1	I	I
SCOPE		0 7	5 A 2	2 1 1
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB)	Left Bank 10 9	\sim		
		8 7 6	5 4 3 5 4 3	2 1 0 2 1 0

STREAM NAME: E-	38		LOCA	ATION:	Warden Waste Site		
STATION: WP 644	DRAINAGE AR	REA (AC)	BASI	N/WATERSHI	ED <i>Green Ri</i>	ver/Willian	ms Creek
LAT: 37-24-13.0	LONG:	87-03-47.7	COUI	NTY; O	hio USGS 7.5	ТОРО;	Equality
DATE: 2/19/14	ГІМЕ: <i>1:32</i> ЕТ	□AM ☑ PM	INVE	STIGATORS;	John Bottom	Bill Samp	eson
TYPE SAMPLE: P-CF				BACT.			
WEATHER: Nov					rain in the last 7 day	s? Snow	
	■ Heav	vy rain	□Yes	✓No	•		
	☐ Stead		Air temper	rature 53	°F. Inches rain	nfall in pa	st 24 hours 0.1 in
		mittent showers	10 % (Cloud Cover	_	•	
Clear ☑	□Clear,	/sunny					
P-Chem: Temp (°F)		-	% Saturation _	pH(S	S.U.) Co	nd.	Grab NA
INSTREAM WATERSHI	ED						
FEATURES		CAL WATERS					
Stream Width EOW		dominant Surrou		e:			
Stream Width BF		Surface Mining	g	Construct	ion 🗹 Fo	rest	
Stream Bottom Width		Deep Mining		□ Commerc		sture/Gra	
Avg. Bankfull Depth		Oil Wells		Industrial		lviculture	
Avg. H ² O Depth Riffle	<i>0.1</i> ft □	Land Disposal		■ Row Crop	ps 🔲 U	ban Runc	off/Storm Sewers
Hydraulic Structures:	- · · · · ·		ream Flow;		-	Stream	
	Bridge Abutments						rennial Intermittent
	Waterfalls	☑ Hig	h 🗖 Very	Rapid or Torre	ntial	☑ Epl	hemeral
□ Other □	Culverts						
Riparian Vegetation:]	Dom. Tree/Shru	b Taxa	Canopy Cove		Chai	nnel Alterations;
Dominate Type:	i	Pin oak			posed (0-25%)		Dredging
✓ Trees ✓	Shrubs	Sweetgum			Exposed (25-50%)		Channelization
☐ Grasses ☑	Herbaceous	Sugar maple			Shaded (50-75%)		(Full Partial)
Number of Strata 3		Beech		☑ Fully Sh	aded (75-100%)		
		Green ash					
	D.C.	D.ca	0/	D	00 0/	D 1	10 0/
Substrate ☑ Est. □ Silt/Clay (<0.06 mm)	P.C	Riffle	%	Run;	90 %	Pool	100 %
Sand (0.06-2 mm)					100		100
Gravel (2-64 mm)							
Cobble (64-256 mm)							
Boulders (>256 mm)							
Bedrock							
Habitat				Condition C	ategory	I	
Parameter	Optim	nal	Subop		Marginal		Poor
	Greater than 50%		30-50% mix of		10-30% mix of stable	habitat:	Less than 10-% stable
1. Epifaunal	favorable for		well suited	for full	habitat availability		habitat" lack of habitat is
Substrate/	colonization and f	1	colonization	potential;	desirable; substrate f		obvious; substrate unstable
Available	of snags, subr	merged logs,	adequate h	nabitat for	disturbed or removed.	•	or lacking.
Cover	undercut banks, co	cobble or other	maintenance o				
	stable habitat and		presence of				
	allow full coloniz		substrate in the				
	(i.e., logs/snags th		fall, but not ye	et prepared for			
	fall and not transie	ent.	colonization (
SCORE	20 19 18	17 16	high end of sca	.3 12 11	10 9 8 7	6	5 4 3 2 1 0
BCORE	Mixture of substr		Mixture of soft		All mud or clay		Hard-pan clay or bedrock;
2. Pool Substrate/	with gravel and		clay; mud may		bottom; little or no		no root mat or vegetation.
Characterization	prevalent; root		some root	mats and	no submerged vegetat		
	submerged vegetat		submerged	vegetation	8.2.1.383		
			present.	-			
SCOPE	20 10 10	17 14	15 14 1	2 12 11	10 0		5 4 2 2 1 0
SCORE	20 19 18			3 12 11	10 9 8 7	6 h mara	5 4 3 2 1 0 Majority of pools small-
3 Pool Availability	Even mix of large		Majority of poo		Shallow pools muc prevalent than deep po		shallow or pools absent.
3. Pool Availability	deep, small-shallo pools present.	ow, sman-deep	very new smallo	····	prevarent man deep po	1015.	shanow of pools absent.
GGOPF					40.0.		
SCORE	20 19 18	17 16	15 14 1	3 12 11	10 9 8 7	6	5 4 3 2 1 0

				<u>, </u>
	Little or no enlargement of	Some new increase in bar	Moderate deposition of new	Heavy despoits of fine
4. Sediment Deposition	islands or point bars and less	formation, mostly from	gravel, sand or fine sediment	material, increased bar
	than 20% of the bottom affected by sediment	gravel, sand or fine sediment;	on old and new bars; 50-80%	development; 80% of the
	affected by sediment deposition.	20-50% of the bottom affected; slight deposition in	of the bottom affected; sediment deposits at	bottom changing frequently; pools almost absent due to
	deposition.	pools.	obstructions, constrictions,	substantial sediment
		pools.	and bends; moderate	deposition.
			deposition of pools prevalent.	deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both	Water fills > 75% of the	Water fills 25-75% of the	Very little water in channel
	lower banks, and minimal	available channel; or <25%	available channel, and/or	and mostly present as
	amount of channel substrate is	of channel substrate is	riffle substrates are mostly	standing pools.
	exposed.	exposed.	exposed.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging	Some channelization present,	Channelization may be	Banks shored with gabion of
	absent or minimal; stream with	usually in areas of bridge	extensive; embankments or	cement; over 80% of the
	normal pattern.	abutments; evidence of past	shoring structures present on	stream reach channelized and
		channelization, i.e., dredging, (greater than past 20 yr.) may	both banks; and 40-80% of stream reach channelized and	disrupted. Instream habitat greatly altered or removed
		be present, but recent	disrupted.	entirely.
		clanic lization is not present.	disrupted.	charery.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream	The bends in the stream	The bends in the stream	Channel straight; waterway
	increase the stream length 3-4	increase the stream length	increase the stream length 2-	has been channelized for a
	times longer than if it was a	2-3 times longer than if it	1 times longer than if it was	long distance.
	straight line. (Note – channel	was in a straight line.	in a straight line.	
	braiding is considered normal			
	in coastal plains and other low-lying areas. This			
	parameter is not easily rated in			
	these areas.			
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of	Moderately stable,	Moderately unstable, 30-60%	Unstable, many eroded areas,
	erosion or bank failure absent	infrequent, small areas of	of bank in reach has areas of	"raw" areas frequently along
	or minimal; little potential for	erosion mostly healed over.	erosion, high erosion	straight sections and bends;
	future problems. <5% of bank	5-30% of bank in reach has	potential during floods.	obvious bank sloughing; 60-
	affected.	areas of erosion.		100% of bank has erosional scars.
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB)		\succ		
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)				
9. Vegetative	More than 90% of the	70-90% of the streambank	50-70% of the streambank	Less than 50% of the
Protection	streambank surfaces and	surfaces covered by native	surfaces covered by	
(score each bank)	immediate riparian zone	vegetation, but one class of	vegetation; disruption	by vegetation; disruptive of
	covered by native vegetation, including trees, understory	plants is not well- represented; disruption	obvious; patches of bare soil or closely cropped vegetation	streambank vegetation is very high; vegetation has
	shrubs, or nonwoody	evident but not affecting full	common; less than one-half	been removed to 5
	macrophytes; vegetative	plant growth potential to any	of the potential plant stubble	centimeters or less in average
	disruption through grazing or	great extent; more than one-	height remaining.	stubble height.
	mowing minimal or not	half of the potential plant		_
	evident; almost all plants	stubble height remaining.		
GGODE	allowed to grow naturally.		<u> </u>	• • •
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB) SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative	Width of riparian zone > 18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6
Zone Width (score	meters; human activities (i.e.,	meters; human activities have	meters; human activities has	meters; little or no riparian
each bank riparian	parking lots, roadbeds, clear-	impacted zone only	inpacted zone a great deal.	vegetation due to human
zone).	cuts, lawns, or crops) have not	minimally.		activities.
	impacted zone			
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB)	D' 14 D 1 40 0			
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)				

STREAM NAME: E-	.39		LOC	ATION:	Warden Waste Site		
STATION: WP 773	DRAINAGE A	AREA (AC)	BASI	N/WATERSHI	ED Green Rive	r/Willia	ms Creek
LAT: 37-24-09.8	LONG:	87-03-38.0	COU	NTY; O	hio USGS 7.5	ГОРО;	Equality
DATE: 2/20/14	ГІМЕ: <i>11:31</i> ЕТ	☑ AM □PM	INVE	ESTIGATORS;	John Bottom/E	ill Samp	oson
TYPE SAMPLE: P-CI				BACT.			
WEATHER: No	w Past 2	24 hours			rain in the last 7 days	? Snow	,
		eavy rain	□Yes	✓No			
☐ ☐ Steady rain Air temperature 60 °F. Inches rainfall in past 24 hours 0.1 in ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐							
P-Chem: Temp (°F)		ear/sunny (mg/l)	% Saturation	pH(S	S.U.) Cone	l ;	76.2
INSTREAM WATERSH	ED				<u> </u>		
FEATURES		OCAL WATERS	SHED FEATU	RES:			
Stream Width EOW		redominant Surrou					
Stream Width BF	4.0 ft	,	g	Construct			
Stream Bottom Width	1.5 ft C			Commerc		ture/Gra	C
Avg. Bankfull Depth Avg. H ² O Depth Riffle	0.4 ft C			☐ Industrial ☐ Row Crop		iculture	e off/Storm Sewers
Avg. n-O Depui Kiille	<u>0.1</u> It	Land Disposal		Row Crop	ps 🔲 Uri	an Kunc	on/Storm Sewers
Hydraulic Structures:	•	St	ream Flow;			Stream '	
	Bridge Abutme						rennial
	Waterfalls	☑ Hig	th 🗖 Very	Rapid or Torre	ntial	☑ Epl	hemeral
	Culverts						
Riparian Vegetation:		Dom. Tree/Shru	ıb Taxa	Canopy Cove			nnel Alterations;
Dominate Type:	CI I	Red maple			posed (0-25%)		Dredging
✓ Trees ✓ Grasses	Shrubs Herbaceous	Pinoak Redceadar			Exposed (25-50%) Shaded (50-75%)		Channelization (✓ Full □ Partial)
	}	Sycamore			aded (75-100%)		
	·	2)					
	P.C	Riffle	%	Run;	70 %	Pool	
Silt/Clay (<0.06 mm)					100		100
Sand (0.06-2 mm) Gravel (2-64 mm)							
Cobble (64-256 mm)							
Boulders (>256 mm)							
Bedrock							
Habitat				Condition C	ategory		_
Parameter		timal	Subor		Marginal		Poor
1 Faif1		0% of substrate	30-50% mix of		10-30% mix of stable		Less than 10-% stable
1. Epifaunal Substrate/		for epifaunal d fish cover; mix	well suited colonization	for full potential;	habitat availability le desirable; substrate fre		habitat" lack of habitat is obvious; substrate unstable
Available		ubmerged logs,		habitat for	disturbed or removed.	quentry	or lacking.
Cover	undercut banks,	cobble or other	maintenance of				<i>y y</i> .
		and at stage to	presence of	f additional			
		nization potential	substrate in the				
	(i.e., logs/snags fall and not trans	that are <u>not</u> new		et prepared for (may rate at			
	run una <u>not</u> trun	,ioiic.	high end of sea				
SCORE		18 17 16	15 14	12 11	10 9 8 7	6	5 4 3 2 1 0
		ostrate materials,	Mixture of sof		All mud or clay of		Hard-pan clay or bedrock;
2. Pool Substrate/ Characterization	with gravel a prevalent; roo		clay; mud may some root		bottom; little or no ro		no root mat or vegetation.
Characterization	submerged vege		submerged	mats and vegetation	no submerged vegetation	11.	
	l l l l l l l l l l l l l l l l l l l		present.	. zgztation			
SCORE	20 19	18 17 16	15 14 1	13 12 11	10 9 8 7	6	5 4 3 2 1 0
BCOKE		ge shallow, large-	Majority of po		Shallow pools much	-	5 4 3 2 1 0 Majority of pools small-
3. Pool Availability		llow, small-deep	very few shallo		prevalent than deep pool		shallow or pools absent.
SCORE		18 17 16	15 14 1	13 12 11	10 9 8 7	6	5 4 3 2 1 0
DOORE	<u> 40 17 .</u>	10 1/ 10	10 17	12 12 11	10 / 0 /	J.	1 3 7 3 2 1 0

				<u>, </u>
	Little or no enlargement of	Some new increase in bar	Moderate deposition of new	Heavy despoits of fine
4. Sediment Deposition	islands or point bars and less	formation, mostly from	gravel, sand or fine sediment	material, increased bar
	than 20% of the bottom affected by sediment	gravel, sand or fine sediment; 20-50% of the bottom	on old and new bars; 50-80%	development; 80% of the
	affected by sediment deposition.	affected; slight deposition in	of the bottom affected; sediment deposits at	bottom changing frequently; pools almost absent due to
	deposition.	pools.	obstructions, constrictions,	substantial sediment
		pools.	and bends; moderate	deposition.
			deposition of pools prevalent.	deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of boar	Water fills > 75% of the	Water fills 25-75% of the	Very little water in channel
	lower banks, and minimal	available channel; or <25%	available channel, and/or	and mostly present as
	amount of channel substrate is	of channel substrate is	riffle substrates are mostly	standing pools.
2005	exposed.	exposed.	exposed.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with	Some channelization present,	Channelization may be extensive; embankments or	Banks shored with gabion of cement; over 80% of the
	normal pattern.	usually in areas of bridge abutments; evidence of past	shoring structures present on	stream reach channelized and
	normar pattern.	channelization, i.e., dredging,	both banks; and 40-80% of	disrupted. Instream habitat
		(greater than past 20 yr.) may	stream reach channelized and	greatly altered or removed
		be present, but recent	disrupted.	entirely.
		channelization is not present.		
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream	The bends in the stream	The bends in the stream	Channel straight; waterway
	increase the stream length 3-4 times longer than if it was a	increase the stream length 2-3 times longer than if it	increase the stream length 2- 1 times longer than if it was	has been channelized for a long distance.
	straight line. (Note – channel	was in a straight line.	in a straight line.	long distance.
	braiding is considered normal	was in a straight inter	in a saaigin iiie.	
	in coastal plains and other			
	low-lying areas. This			
	parameter is not easily rated in			
CCORE	these areas.	15 14 12 12 11	10.00	5 4 2 2 1 0
8. Bank Stability	20 19 18 17 16 Banks stable; evidence of	15 14 13 12 11 Moderately stable,	10 9 8 7 6 Moderately unstable, 30-60%	5 4 3 2 1 0 Unstable, many eroded areas,
o. Dank Stability	erosion or bank failure absent	infrequent, small areas of	of bank in reach has areas of	"raw" areas frequently along
	or minimal; little potential for	erosion mostly healed over.	erosion, high erosion	straight sections and bends;
	future problems. <5% of bank	5-30% of bank in reach has	potential during floods.	obvious bank sloughing; 60-
	affected.	areas of erosion.		100% of bank has erosional
SCORE	T 6/ D 1 10 0		5 4 3	scars.
(LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)	Right Bank 10 7		3 4 3	
9. Vegetative	More than 90% of the	70-90% of the streambank	50-70% of the streambank	Less than 50% of the
Protection	streambank surfaces and	surfaces covered by native	surfaces covered by	
(score each bank)	immediate riparian zone	vegetation, but one class of	vegetation; disruption	by vegetation; disruptive of
	covered by native vegetation,	plants is not well-	obvious; patches of bare soil	streambank vegetation is
	including trees, understory	represented; disruption	or closely cropped vegetation	very high; vegetation has
	shrubs, or nonwoody macrophytes; vegetative	evident but not affecting full plant growth potential to any	common; less than one-half of the potential plant stubble	been removed to 5 centimeters or less in average
	disruption through grazing or	great extent; more than one-	height remaining.	stubble height.
	mowing minimal or not	half of the potential plant	neight remaining.	State in igna
	evident; almost all plants	stubble height remaining.		
	allowed to grow naturally.		_	
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB)	D!:14 D:::1 40 0	0 7	5 4 2	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative	Width of riparian zone > 18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6
Zone Width (score	meters; human activities (i.e.,	meters; human activities have	meters; human activities has	meters; little or no riparian
each bank riparian	parking lots, roadbeds, clear-	impacted zone only	inpacted zone a great deal.	vegetation due to human
zone).	cuts, lawns, or crops) have not	minimally.	1	activities.
	impacted zone			
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB)	D114D 1 40 0			• • •
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)				

STREAM NAME: E-	-40	LOCATI	ION:	Warden Waste Site – dr	ains to Wetland G
STATION: WP 727	DRAINAGE AREA (AC)	BASIN/V	WATERSHE	ED Green River/	Williams Creek
LAT: 37-24-10.2	LONG: 87-03-37.0	COUNT	Y; <i>Ol</i>	hio USGS 7.5 TO	OPO; Equality
DATE: 2/20/14	ΓΙΜΕ: <i>10:22</i> ΕΤ ☑ ΑΜ □ PM	INVEST	TIGATORS;	John Bottom/Bill	Sampson
TYPE SAMPLE: P-Cl	HEM Macroinvertebrate	☐ FISH ☐ BAC	CT.		
WEATHER: No	w Past 24 hours	Has there be	en a heavy	rain in the last 7 days?	Snow
	Heavy rain	□Yes	✓No		
	Steady rain	Air temperatu	ire <u>60</u>	F. Inches rainfall	l in past 24 hours 0.1 in
	☑ Intermittent showers	<u>90</u> % Clo	oud Cover		
Clouds ☑	□Clear/sunny				
P-Chem: Temp (°F)	D.O. (mg/l)	% Saturation	pH(S	S.U.) Cond.	Grab <i>NA</i>
INSTREAM WATERSH					
FEATURES	LOCAL WATERS		S:		
Stream Width EOW	2-3 ft Predominant Surrou			_	
Stream Width BF	4.5 ft Surface Minin	-			
Stream Bottom Width	1.5 ft Deep Mining	_			re/Grazing
Avg. Bankfull Depth	<u>0.7</u> ft ☐ Oil Wells	_			ulture
Avg. H ² O Depth Riffle	ft		Row Crop	os 🔲 Urbar	Runoff/Storm Sewers
Hydraulic Structures:		ream Flow;		St	ream Type;
	Bridge Abutments □ Dry		□ Low	□ Normal □	
***	Waterfalls		pid or Torrer		
	Culverts	şii 🚨 Very Kuj	Trickle-sn		Бристега Беер
		1.77			Cl. 1 Ale di
Riparian Vegetation: Dominate Type:	Dom. Tree/Shru	_	Canopy Cove Fully Ex	r; posed (0-25%)	Channel Alterations; ☐ Dredging
✓ Trees ✓	Red maple Shrubs Pinoak			Exposed (0-23%) Exposed (25-50%)	DredgingChannelization
☐ Grasses ☑	Herbaceous Redcedar			Shaded (50-75%)	(Full Partial)
	3 Sweetgum	 		aded (75-100%)	
	Elm		, ~	(10 -00/0)	
	Lim				
	P.C Riffle	%	Run;	%	Pool %
Silt/Clay (<0.06 mm)					100
Sand (0.06-2 mm)					
Gravel (2-64 mm)					
Cobble (64-256 mm)					
Boulders (>256 mm)					
Bedrock			~ 11.1 ~		
Habitat			Condition C	- V	
Parameter	Optimal	Suboptin		Marginal	Poor
1. Epifaunal	Greater than 50% of substrate favorable for epifaunal	30-50% mix of sta well suited	for full	10-30% mix of stable ha habitat availability less	
1. Epifaunal Substrate/	colonization and fish cover; mix	colonization	potential;	desirable; substrate frequ	
Available	of snags, submerged logs,	adequate habi		disturbed or removed.	or lacking.
Cover	undercut banks, cobble or other	maintenance of p		distarced of removed.	or morning.
	stable habitat and at stage to	presence of	additional		
	allow full colonization potential	substrate in the fo	orm of new		
	(i.e., logs/snags that are <u>not</u> new	fall, but not yet p			
	fall and <u>not</u> transient.	colonization (ma			
CCOPE	20 10 10 17 17	high end of scale).		10 0 0 7 7	5 4 2 2 1 6
SCORE	20 19 18 17 16		12 11	10 9 8 7 6	
2. Pool Substrate/	Mixture of substrate materials, with gravel and firm sand	Mixture of soft san clay; mud may be		All mud or clay or bottom; little or no root	
2. Pool Substrate/ Characterization	prevalent; root mats and		nats and	no submerged vegetation.	
Characterization	submerged vegetation common.	submerged	vegetation	no suomergeu vegetation.	
		present.			
GGODE	10 10 15	•	48.11	(10)0 0 0	
SCORE	20 19 18 17 16	15 14 13	12 11	10 9 8 7 6	
2 Pool Avoilability	Even mix of large shallow, large-	Majority of pools very few shallow.	iarge-deep;	Shallow pools much prevalent than deep pools.	
3. Pool Availability	deep, small-shallow, small-deep pools present.	very iew shanow.		prevalent man deep pools.	sharow or poors absent.
ggopp.		4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	10 11	40.00.00	
SCORE	20 19 18 17 16	15 14 13	12 11	10 9 8 7 6	4 3 2 1 0

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at	Heavy despoits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to
	перознюн.	pools.	obstructions, constrictions, and bends; moderate	substantial sediment deposition.
			deposition of pools prevalent.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both	Water fills > 75% of the	Water fills 25-75% of the	Very little water in channel
	lower banks, and minimal	available channel; or <25%	available channel, and/or	and mostly present as
	amount of channel substrate is	of channel substrate is	riffle substrates are mostly	standing pools.
GGODE	exposed.	exposed.	exposed.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with	Some channelization present, usually in areas of bridge	Channelization may be extensive; embankments or	Banks shored with gabion of cement; over 80% of the
	normal pattern.	abutments; evidence of past	shoring structures present on	stream reach channelized and
	normar pattern.	channelization, i.e., dredging,	both banks; and 40-80% of	disrupted. Instream habitat
		(greater than past 20 yr.) may	stream reach channelized and	greatly altered or removed
		be present, but recent	disrupted.	entirely.
		clann lization is not present.		,
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream	The bends in the stream	The bends in the stream	Channel straight; waterway
-	increase the stream length 3-4	increase the stream length	increase the stream length 2-	has been channelized for a
	times longer than if it was a	2-3 times longer than if it	1 times longer than if it was	long distance.
	straight line. (Note – channel	was in a straight line.	in a straight line.	
	braiding is considered normal			
	in coastal plains and other			
	low-lying areas. This			
	parameter is not easily rated in these areas.			
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of	Moderately stable,	Moderately unstable, 30-60%	Unstable, many eroded areas,
o. Dank Stability	erosion or bank failure absent	infrequent, small areas of	of bank in reach has areas of	"raw" areas frequently along
	or minimal; little potential for	erosion mostly healed over.	erosion, high erosion	straight sections and bends;
	future problems. <5% of bank	5-30% of bank in reach has	potential during floods.	obvious bank sloughing; 60-
	affected.	areas of erosion.		100% of bank has erosional
acconn				scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)	Right Blink To	, ,		
9. Vegetative	More than 90% of the	70-90% of the streambank	50-70% of the streambank	Less than 50% of the
Protection	streambank surfaces and			
(score each bank)	immediate riparian zone	vegetation, but one class of	vegetation; disruption	by vegetation; disruptive of
	covered by native vegetation,	plants is not well-	obvious; patches of bare soil	streambank vegetation is
	including trees, understory	represented; disruption	or closely cropped vegetation	very high; vegetation has
	shrubs, or nonwoody	evident but not affecting full	common; less than one-half	been removed to 5
	macrophytes; vegetative	plant growth potential to any	of the potential plant stubble	centimeters or less in average
	disruption through grazing or	great extent; more than one-	height remaining.	stubble height.
	mowing minimal or not	half of the potential plant		
	evident; almost all plants	stubble height remaining.		
SCORE	allowed to grow naturally Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB)	Left Bank 10 9	, v	3 4 3	2 1 0
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)	Right Bank 10 (9)			
10. Riparian Vegetative	Width of riparian zone > 18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6
Zone Width (score	meters; human activities (i.e.,	meters; human activities have	meters; human activities has	meters; little or no riparian
each bank riparian	parking lots, roadbeds, clear-	impacted zone only	inpacted zone a great deal.	vegetation due to human
zone).	cuts, lawns, or crops) have not	minimally.		activities.
7-	impacted zone			
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB)				
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)				

STREAM NAME: E-	41		LOCA	ATION:	Warden Waste Site		
STATION: WP 718	DRAINAGE A	AREA (AC)	BASI	N/WATERSHE	ED Green River/	Williams (Creek
LAT: 37-23-57.6	LONG:	87-03-32.3	COU	NTY; Ol	hio USGS 7.5 TO	OPO;	Equality
DATE: 2/20/14	ГІМЕ: <i>1:32</i> ЕТ	□AM ☑ PM	INVE	STIGATORS;	John Bottom/Bill	Sampson	
TYPE SAMPLE: □ P-CF	HEM 🔲 Macr	oinvertebrate		ACT.			
WEATHER: Nov	w Past 2	24 hours			rain in the last 7 days?	Snow	
<u>_</u>		avy rain	□Yes	☑No			
_		eady rain	Air temper	ature <u>50</u>	F. Inches rainfall	l in past 24	4 hours 0.1 in
☐ ☐ Intermittent showers 100 % Cloud Cover Clear ☐ ☐ Clear/sunny							
P-Chem: Temp (°F)		(mg/l)	% Saturation _	pH(S	S.U.) Cond.	64.1	Grab
INSTREAM WATERSHI		OCAL WATER		NEG.			
FEATURES Stream Width EOW		OCAL WATERS					
Stream Width BF	2-2.5 ft Pr 5.0 ft □	redominant Surrou Surface Mining		:. Construct	ion 🗹 Fores	t	
Stream Bottom Width	1.0 ft		5	□ Commerc		re/Grazing	o .
Avg. Bankfull Depth	0.4 ft			☐ Industrial		ulture	
Avg. H ² O Depth Riffle	<i>0.1</i> ft □	Land Disposal		□ Row Crop	os 🔲 Urbar	Runoff/S	Storm Sewers
Hydraulic Structures: ☐ Dams ☐	Duides Aboutons		ream Flow; Poole	d 🗖 Low		ream Type Perenn	
	Bridge Abutme Waterfalls	nts □ Dry ☑ Hig		a Low Rapid or Torrer			
	Culverts	E Ing	n 🗖 very	Kapid of Torrer	itiai 🔽	Ерпспі	стаг 🚨 Беер
Riparian Vegetation:		Dom. Tree/Shru	h Toyo	Canopy Cove	**	Channal	l Alterations;
Dominate Type:		Sycamore	U Taxa		posed (0-25%)		edging
✓ Trees ✓	Shrubs	Pinoak			Exposed (25-50%)		annelization
☐ Grasses ☑	Herbaceous	Red maple			Shaded (50-75%)	(2	
Number of Strata 3		•			aded (75-100%)	,	,
Substrate ☑ Est. □	P.C	Riffle	%	Run;	80 %	Pool	20 %
Silt/Clay (<0.06 mm)					100		100
Sand (0.06-2 mm)					100		100
Gravel (2-64 mm)							
Cobble (64-256 mm)							
Boulders (>256 mm)							
Bedrock							
Habitat	0.4		G 1	Condition C			n
Parameter		imal 0% of substrate	Subop 30-50% mix of		Marginal 10-30% mix of stable ha	hitot: Lo	Poor ess than 10-% stable
1. Epifaunal		or epifaunal	well suited	for full	habitat availability less		abitat" lack of habitat is
Substrate/		I fish cover; mix	colonization	potential;	desirable; substrate frequ		ovious; substrate unstable
Available	of snags, su	ibmerged logs,	adequate h	abitat for	disturbed or removed.		lacking.
Cover		cobble or other	maintenance of				
		and at stage to	presence of				
		nization potential that are <u>not</u> new	substrate in the fall, but not ye				
	fall and not trans		colonization (
	und <u>not</u> utilit		nigh and of scal	le)			
SCORE		18 17 16	15 14 1	3 12 11	10 9 8 7 6		5 4 3 2 1 0
		ostrate materials,	Mixture of soft		All mud or clay or		ard-pan clay or bedrock;
2. Pool Substrate/	with gravel a		clay; mud may		bottom; little or no root		o root mat or vegetation.
Characterization	prevalent; roc		some root submerged	mats and	no submerged vegetation.		
	submerged veger	auon commun.	present.	vegetation			
GGOPT	•	10 1- ::	•		40.0.0		
SCORE		18 17 16		3 12 11	10 9 8 7 6		5 4 3 2 1 0
3. Pool Availability		ge shallow, large- llow, small-deep	Majority of poo		Shallow pools much prevalent than deep pools.		lajority of pools small- nallow or pools absent.
5. 1 001 Availability	pools present.	now, sman-ueep	very tew shallo	vv .	prevalent man deep pools.	. SII	ianow or poors ausent.
SCODE		10 17 17	15 14 1	2 12 11	10 0 0		5 4 2 2 1 0
SCORE	20 19 1	18 17 16	15 14 1	3 12 11	10 9 8 6		5 4 3 2 1 0

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions,	Heavy despoits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment
		Ī	and bends; moderate	deposition.
			deposition of pools prevalent.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both	Water fills > 75% of the	Water fills 25-75% of the	Very little water in channel
	lower banks, and minimal	available channel; or <25%	available channel, and/or	and mostly present as
	amount of channel substrate is	of channel substrate is	riffle substrates are mostly	standing pools.
GGODE	exposed.	exposed.	exposed.	5 4 2 2 1 0
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with	Some channelization present,	Channelization may be extensive; embankments or	Banks shored with gabion of cement; over 80% of the
	normal pattern.	usually in areas of bridge abutments; evidence of past	shoring structures present on	stream reach channelized and
	normai pattern.	channelization, i.e., dredging,	both banks; and 40-80% of	disrupted. Instream habitat
		(greater than past 20 yr.) may	stream reach channelized and	greatly altered or removed
		be present, but recent	disrupted.	entirely.
		c'ann lization is not present.		,
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream	The bends in the stream	The bends in the stream	Channel straight; waterway
-	increase the stream length 3-4	increase the stream length	increase the stream length 2-	has been channelized for a
	times longer than if it was a	2-3 times longer than if it	1 times longer than if it was	long distance.
	straight line. (Note – channel	was in a straight line.	in a straight line.	
	braiding is considered normal			
	in coastal plains and other			
	low-lying areas. This			
	parameter is not easily rated in these areas.			
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of	Moderately stable,	Moderately unstable, 30-60%	Unstable, many eroded areas,
6. Dank Stability	erosion or bank failure absent	infrequent, small areas of	of bank in reach has areas of	"raw" areas frequently along
	or minimal; little potential for	erosion mostly healed over.	erosion, high erosion	straight sections and bends;
	future problems. <5% of bank	5-30% of bank in reach has	potential during floods.	obvious bank sloughing; 60-
	affected.	areas of erosion.		100% of bank has erosional
				scars.
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB)	D: 14 D 1 10 0		5 4 3	2 1 0
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)	M 4 000/ 6 4	70.000/ 6 d	50.700/ 6 .1	T 1 500/ 6 1
9. Vegetative Protection	More than 90% of the streambank surfaces and	70-90% of the streambank surfaces covered by native	50-70% of the streambank surfaces covered by	Less than 50% of the streambank surfaces covered
(score each bank)	streambank surfaces and immediate riparian zone	vegetation, but one class of	surfaces covered by vegetation; disruption	by vegetation; disruptive of
(score each bank)	covered by native vegetation,	plants is not well-	obvious; patches of bare soil	streambank vegetation is
	including trees, understory	represented; disruption	or closely cropped vegetation	very high; vegetation has
	shrubs, or nonwoody	evident but not affecting full	common; less than one-half	been removed to 5
	macrophytes; vegetative	plant growth potential to any	of the potential plant stubble	centimeters or less in average
	disruption through grazing or	great extent; more than one-	height remaining.	stubble height.
	mowing minimal or not	half of the potential plant		-
	evident; almost all plants	stubble height remaining.		
	allowed to grow naturally.			
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB)				
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)				
10. Riparian Vegetative	Width of riparian zone > 18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6
Zone Width (score	meters; human activities (i.e.,	meters; human activities have	meters; human activities has	meters; little or no riparian
each bank riparian	parking lots, roadbeds, clear-	impacted zone only	inpacted zone a great deal.	vegetation due to human
zone).	cuts, lawns, or crops) have not impacted zone	minimally.		activities.
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB)	Lett Dank 10 9	0 / 0		
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)	Ingui Duin 10	' '		
(/	1	1		İ

STREAM NAME: E-	-42		LOC	ATION:	Warden Waste Site	
STATION: WP 258	DRAINAGE A	AREA (AC)	BAS	IN/WATERSHI	ED Green River/	Williams Creek
LAT: 37-23-59.5	LONG:	87-03-28.9	COU	NTY; O	hio USGS 7.5 To	OPO; Equality
DATE: 3/11/14	ΓΙΜΕ: <i>11:03</i> ΕΤ	☑ AM □ PM	INVI	ESTIGATORS;	John Bottom/Bil	l Sampson
TYPE SAMPLE: P-CI				BACT.		•
WEATHER: No	w Past 2	24 hours	Has there	been a heavy	rain in the last 7 days?	Snow
		eavy rain	□Yes	✓No	-	
□ □ Clear ☑	□ □ Intermittent showers <u>10</u> % Cloud Cover					
P-Chem: Temp (°F)	48.9 D.O.	(mg/l)	% Saturation	pH(5	S.U.) Cond.	☐ Grab
INSTREAM WATERSH	ED					
FEATURES		OCAL WATERS	-			
Stream Width EOW		redominant Surrou				
Stream Width BF Stream Bottom Width	2.5 ft 1.0 ft	•	g	□ Construct □ Commerce	-	· ·
Avg. Bankfull Depth	0.25 ft			☐ Commerce ☐ Industrial		re/Grazing culture
Avg. H ² O Depth Riffle	6.23 It E			Row Crop	-	n Runoff/Storm Sewers
Tryg. If o Beptil Rillie		Eand Disposar		L Row Crop	ps 2 010a.	i Kanon/Storm Sewers
Hydraulic Structures:			ream Flow;	_		tream Type;
	Bridge Abutme					Perennial Intermittent
	Waterfalls Culverts	☑ Hig	gh 🔲 Very	Rapid or Torre	ntial 	I Ephemeral □ Seep
	Curverts			T a a		l ai
Riparian Vegetation: Dominate Type:		Dom. Tree/Shru Red maple	ib Taxa <i>River birch</i>	Canopy Cove	er; aposed (0-25%)	Channel Alterations; Dredging
✓ Trees ✓	Shrubs	Rea mapie Pinoak	Kiver birch		Exposed (0-25%)	Channelization
☐ Grasses ☑	Herbaceous	Redceadar			Shaded (50-75%)	(✓ Full □ Partial)
Number of Strata	3	Sycamore			aded (75-100%)	(
_		Beech				
Substrate ☑ Est. □	P.C	Riffle	%	Run;	100 %	Pool %
Silt/Clay (<0.06 mm)					100	
Sand (0.06-2 mm)					100	
Gravel (2-64 mm)						
Cobble (64-256 mm)						
Boulders (>256 mm)						
Bedrock	ı					
Habitat	0.4	. ,	6.1	Condition C		
Parameter		imal 0% of substrate		ptimal f stable habitat;	Marginal 10-30% mix of stable ha	Poor abitat; Less than 10-% stable
1. Epifaunal		or epifaunal	well suited		habitat availability less	
Substrate/		fish cover; mix	colonization	potential;	desirable; substrate frequ	
Available		ubmerged logs,	1	habitat for	disturbed or removed.	or lacking.
Cover		cobble or other		of populations;		
		and at stage to nization potential	presence of	f additional e form of new		
		that are <u>not</u> new		et prepared for		
	fall and not trans		colonization	(may rate at		
2225			high end of sca		10 0 0 -	
SCORE		18 17 16		13 12 11	10 9 8 7 6	
2. Pool Substrate/	Mixture of sub with gravel	ostrate materials, and firm sand		t sand, mud, or y be dominant;	All mud or clay or bottom; little or no room	
Characterization	prevalent; roo		some root	mats and	no submerged vegetation	
	submerged vege		submerged	vegetation		
			present.			
SCORE	20 19	18 17 16	15 14	13 12 11	10 9 8 7 6	5 4 3 2 1 0
		ge shallow, large-		ools large-deep;	Shallow pools much	more Majority of pools small-
3. Pool Availability	± '	llow, small-deep	very few shallo	ow.	prevalent than deep pools	. shallow or pools absent.
	pools present.					
SCORE	20 19	18 17 16	15 14	13 12 11	10 9 8 7 6	5 3 2 1 0

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy despoits of fine material, increased bar development; 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4 times longer than if it was a straight line. (Note – channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2-1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB)				
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities has inpacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
` '	I			I .

STREAM NAME: E-4	43		LOCA	ATION:	Warden Waste Site		
STATION: WP 261	DRAINAGE A	AREA (AC)	BASI	N/WATERSHE	ED Green R	iver/Willian	ns Creek
LAT: 37-24-02.3	LONG:	87-03-24.5	COUI	NTY; Ol	hio USGS 7	.5 TOPO;	Equality
DATE: 3/11/14 I	TIME: 11:03 ET	☑ AM □PM	INVE	STIGATORS;	John Botton	ı/Bill Samps	son
TYPE SAMPLE: P-CH	IEM 🔲 Macro	oinvertebrate [ACT.			
WEATHER: Now	WEATHER: Now Past 24 hours Has there been a heavy rain in the last 7 days? <i>Snow</i>						
<u>_</u>		avy rain	□Yes	✓No			
		ady rain	Air temper	ature 70	_ °F. Inches ra	infall in pas	st 24 hours 0.0 in
□ Clear ☑		rmittent showers ar/sunny	<u>10</u> % (Cloud Cover			
P-Chem: Temp (°F)		mg/l)	% Saturation _	pH(S	S.U.) Co	ond.	Grab NA
INSTREAM WATERSHE							
FEATURES St. Wild FOW		OCAL WATERS					
Stream Width EOW Stream Width BF	$\frac{1-1.5}{3.0}$ ft Properties	edominant Surrou Surface Mining		e: Construct	ion 🗹 F	Forest	
Stream Bottom Width	0.75 ft □	_	S	Commerc		asture/Graz	zina
Avg. Bankfull Depth	0.35 ft □			☐ Industrial		Silviculture	Emg
Avg. H ² O Depth Riffle	ft 🗖			☐ Row Crop			ff/Storm Sewers
							_
Hydraulic Structures: Dams	Bridge Abutmer		ream Flow; Poole	d 🗖 Low	□ Normal	Stream T	Type; ennial Intermittent
	Waterfalls	ns ☐ Dry ☑ Hig		Rapid or Torrer			nemeral Seep
	Culverts	E Ing	ii 🚨 very	rapid of Toffer	ittu	ш Брг	етегаг 🚨 веер
Riparian Vegetation:		Dom. Tree/Shru	h Taxa	Canopy Cove	r.	Char	nnel Alterations;
Dominate Type:			River birch		posed (0-25%)		Dredging
✓ Trees ✓	Shrubs	Pinoak			Exposed (25-50%)		Channelization
☐ Grasses ☑	Herbaceous	Redceadar			Shaded (50-75%)		(☑ Full □ Partial)
Number of Strata 3		Sycamore		✓ Fully Sh	aded (75-100%)		
		Green ash					
	P.C	Riffle	%	Run;	100 %	Pool	%
Silt/Clay (<0.06 mm)					100		
Sand (0.06-2 mm)							
Gravel (2-64 mm) Cobble (64-256 mm)							
Boulders (>256 mm)							
Bedrock							
Habitat				Condition C	ategory	u .	
Parameter	Opti		Subop		Marginal		Poor
	Greater than 50		30-50% mix of		10-30% mix of stab		Less than 10-% stable
1. Epifaunal Substrate/	favorable for colonization and	1	well suited colonization	for full	habitat availability		habitat" lack of habitat is obvious; substrate unstable
Available		bmerged logs,		potential; abitat for	desirable; substrate disturbed or removed		or lacking.
Cover	undercut banks,		maintenance o				6 .
	stable habitat a	U	presence of				
	allow full colon		substrate in the				
	(i.e., logs/snags fall and not trans		fall, but not ye colonization (
	<u>1101</u> trulis.		high end of sca				
SCORE		8 17 16		3 12 11	10 9 8 7		5 4 3 2 1 0
0 D101 + + +	Mixture of sub		Mixture of soft		All mud or clay		Hard-pan clay or bedrock;
2. Pool Substrate/ Characterization	with gravel a prevalent; roo		clay; mud may some root		bottom; little or no no submerged vegeta		no root mat or vegetation.
Characterization	submerged veget		submerged	mats and vegetation	no submerged vegeta	uiOII.	
	. 6		present.				
SCORE	20 19 1	8 17 16	15 14 1	3 12 11	10 9 8 7	' 6	5 4 3 2 1 0
2001112	Even mix of larg		Majority of poo		Shallow pools mu		Majority of pools small-
3. Pool Availability	deep, small-shal		very few shallo		prevalent than deep p		shallow or pools absent.
	pools present.						
SCORE	20 19 1	8 17 16	15 14 1	3 12 11	10 9 8 7	6	5 1 3 2 1 0

	<u></u>			,
	Little or no enlargement of	Some new increase in bar	Moderate deposition of new	Heavy despoits of fine
4. Sediment Deposition	islands or point bars and less	formation, mostly from	gravel, sand or fine sediment	material, increased bar
	than 20% of the bottom affected by sediment	gravel, sand or fine sediment; 20-50% of the bottom	on old and new bars; 50-80%	development; 80% of the
	affected by sediment deposition.	affected; slight deposition in	of the bottom affected; sediment deposits at	bottom changing frequently; pools almost absent due to
	deposition.	pools.	obstructions, constrictions,	substantial sediment
		pools.	and bends; moderate	deposition.
			deposition of pools prevalent.	deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of bear	Water fills > 75% of the	Water fills 25-75% of the	Very little water in channel
	lower banks, and minimal	available channel; or <25%	available channel, and/or	and mostly present as
	amount of channel substrate is	of channel substrate is	riffle substrates are mostly	standing pools.
CCOPE	exposed.	exposed.	exposed.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with	Some channelization present, usually in areas of bridge	Channelization may be extensive; embankments or	Banks shored with gabion of cement; over 80% of the
	normal pattern.	abutments; evidence of past	shoring structures present on	stream reach channelized and
	r	channelization, i.e., dredging,	both banks; and 40-80% of	disrupted. Instream habitat
		(greater than past 20 yr.) may	stream reach channelized and	greatly altered or removed
		be present, but recent	disrupted.	entirely.
ggopp	20 40 40	channelization is not present.	40.00.00	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	Channel straights protograms
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4	The bends in the stream increase the stream length	The bends in the stream increase the stream length 2-	Channel straight; waterway has been channelized for a
	times longer than if it was a	2-3 times longer than if it	1 times longer than if it was	long distance.
	straight line. (Note – channel	was in a straight line.	in a straight line.	
	braiding is considered normal		5	
	in coastal plains and other			
	low-lying areas. This			
	parameter is not easily rated in			
SCORE	these areas. 20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of	Moderately stable,	Moderately unstable, 30-60%	Unstable, many eroded areas,
o. Bank Stability	erosion or bank failure absent	infrequent, small areas of	of bank in reach has areas of	"raw" areas frequently along
	or minimal; little potential for	erosion mostly healed over.	erosion, high erosion	straight sections and bends;
	future problems. <5% of bank	5-30% of bank in reach has	potential during floods.	obvious bank sloughing; 60-
	affected.	areas of erosion.		100% of bank has erosional
SCORE	Left Bank 10 9	8 7 6	5 4 3	scars. 2 1 0
(LB)	Left Bank 10 9		5 4 5	
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)	Tught Dumi 10			2 1 0
9. Vegetative	More than 90% of the	70-90% of the streambank	50-70% of the streambank	Less than 50% of the
Protection	streambank surfaces and	surfaces covered by native	surfaces covered by	
(score each bank)	immediate riparian zone	vegetation, but one class of	vegetation; disruption	by vegetation; disruptive of
	covered by native vegetation,	plants is not well-	obvious; patches of bare soil	streambank vegetation is
	including trees, understory shrubs, or nonwoody	represented; disruption evident but not affecting full	or closely cropped vegetation common; less than one-half	very high; vegetation has been removed to 5
	macrophytes; vegetative	plant growth potential to any	of the potential plant stubble	centimeters or less in average
	disruption through grazing or	great extent; more than one-	height remaining.	stubble height.
	mowing minimal or not	half of the potential plant		
	evident; almost all plants	stubble height remaining.		
acopr	allowed to grow naturally.		<u>.</u>	
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB) SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
(RB)	Right Bank 10 9	8 7 6	3 4 3	4 1 U
10. Riparian Vegetative	Width of riparian zone > 18	Width of riparian zone 12-18	Width of riparian zone 6-12	Width of riparian zone <6
Zone Width (score	meters; human activities (i.e.,	meters; human activities have	meters; human activities has	meters; little or no riparian
each bank riparian	parking lots, roadbeds, clear-	impacted zone only	inpacted zone a great deal.	vegetation due to human
zone).	cuts, lawns, or crops) have not	minimally.		activities.
	impacted zone		_	
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
(LB) SCORE	Right Bank 10 9	2 7	5 4 3	2 1 0
(RB)	Right Bank 10 9	8 (7) 6	3 4 3	4 1 U
(***)	1		<u> </u>	l



Perennial 1 (P-1 US) - Upstream reach, looking upstream



Perennial 1 (P-1 MS) -Midstream reach, looking upstream



Perennial 1 (P-1 DS) – Downstream reach, looking upstream



Perennial 1 (P-1 DS) –Downstream reach, looking downstream



Perennial 2 (P-2 US) – Upstream reach, looking downstream



Perennial 2 (P-2 DS) -Downstream reach, looking upstream



Intermittent 6 (I-6) – Looking upstream



Intermittent 6 (I-6) – Looking downstream



Intermittent 7 (I-7) - Looking upstream



Intermittent 7 (I-7) – Looking downstream



Intermittent 8 (I-8US) – Looking upstream in upstream reach



Intermittent 8 (I-8US) – Looking downstream in upstream reach



Intermittent 8 (I-8DS) - Looking upstream in downstream reach



Intermittent 8 (I-8DS) - Looking downstream in downstream reach



Intermittent 9 (I-9) - Looking upstream



Intermittent 9 (I-9) – Looking downstream



Ephemeral 37 (E-37) – Looking upstream



Ephemeral 37 (E-37) – Looking downstream



Ephemeral 38 (E-38) – Looking upstream



Ephemeral 38 (E-38) – Looking downstream



Ephemeral 39 (E-39) – Looking upstream



Ephemeral 39 (E-39) – Looking downstream



Ephemeral 40 (E-40) – Looking upstream



Ephemeral 40 (E-40) – Looking downstream



Ephemeral 41 (E-41) – Looking upstream



Ephemeral 41 (E-41) – Looking downstream



Ephemeral 42 (E-42) – Looking upstream



Ephemeral 42 (E-42) – Looking downstream



Ephemeral 43 (E-43) – Looking upstream



Ephemeral 43 (E-43) – Looking downstream

Project/Site: MITIGATION AREA - WETLAND D Cit	sy/County: OHID Sampling Date: 2/18/14
	WASTE SITE State: KY Sampling Point: WP 483
Investigator(s): BILL SAMPSON, JOHN BOTTOM SE	
	relief (concave, convex, none): _concave Slope (%): _22%
Subregion (LRR or MLRA): <u>LRR N</u> Lat: <u>37° 23' 3</u>	-8.5" Long: 87°03' 39.5" Datum: W6584
Soil Map Unit Name: STENDAL SILT LOAM	NWI classification: PFo 1B
Are climatic / hydrologic conditions on the site typical for this time of year.	
Are Vegetation, Soil, or Hydrology significantly dis	
Are Vegetation, Soil, or Hydrology naturally proble	
, or righting materially problem	(
SUMMARY OF FINDINGS - Attach site map showing s	ampling point locations, transects, Important features, etc.
Hydrophytic Vegetation Present? Yes No	Is the Sampled Area
Hydric Soil Present? Yes No	within a Wetland? Yes No
Wetland Hydrology Present? Yes No	
Remarks:	
7.	
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)	Surface Soil Cracks (B6)
✓ Surface Water (A1) True Aquatic Plan	ts (B14) Sparsely Vegetated Concave Surface (B8)
High Water Table (A2) Hydrogen Sulfide	
	heres on Living Roots (C3) V Moss Trim Lines (B16)
Water Marks (B1) Presence of Redu	
Sediment Deposits (B2) Recent Iron Redu	ction in Tilled Soils (C6) Crayfish Burrows (C8)
Drift Deposits (B3) Thin Muck Surfac	e (C7) Saturation Visible on Aerial Imagery (C9)
Algal Mat or Crust (B4) Other (Explain In	Remerks) Stunted or Stressed Plants (D1)
Iron Deposits (B5)	Geomorphic Position (D2)
Inundation Visible on Aerial Imagery (B7)	Shallow Aquitard (D3)
Water-Stained Leaves (B9)	Microtopographic Relief (D4)
Aquatic Fauna (B13)	FAC-Neutral Test (D5)
Field Observations:	
Surface Water Present? Yes _/_ No Depth (inches): _	
Water Table Present? Yes No Depth (inches): _	
Saturation Present? Yes No Depth (inches): _ (includes capillary fringe)	Wetland Hydrology Present? Yes V No
Describe Recorded Data (stream gauge, monitoring well, aerial photos,	previous inspections), if available:
Remarks:	

	ames of p	oldino.		Sampling Point: 483
	Absolute	Dominant		Dominance Test worksheet:
Tree Stratum (Plot size: 30)		Species?		Number of Dominant Species
1. Swamp CHESTNUT DAK (QUERCUS MICHAUKI)				That Are OBL, FACW, or FAC:(A)
2. PIN OPK (Q. PALUETRIS)	15	No_	FACN	Total Number of Dominant
3. TRONWOOD (CARPINUS CAROLINIANA)	10_	No	FAC	Species Across All Strata:(B)
4				Barrier Carrier
5				Percent of Dominant Species That Are OBL, FACW, or FAC:/(A/B)
6.				(102)
	45	= Total Cov	er	Prevalence Index worksheet:
man v				Total % Cover of: Multiply by:
50% of total cover: 32.	<u>></u> 20% or	total cover:	1	OBL species x 1 =
Sapling Stratum (Plot size:/5')				FACW species x 2 =
1. SWEETGUM (LIQUIDAMBAR STYRACIFLU				FAC species x 3 =
2. RED MAPLE (ACER RUBRUM)	<u> 20</u>	755	FAC	FACU species x 4 =
3				UPL species x5 =
4				Column Totals: (A) (B)
5				(4)
6				Prevalence Index = B/A =
	25	= Total Cov	ЭГ	Hydrophytic Vegetation Indicators:
50% of total cover: <u>/Z,</u> ≤	200/	teial accor	5	1 - Rapid Test for Hydrophytic Vegetation
	20% 00	total cover.		2 - Dominance Test is >50%
Shrub Stratum (Ptot size:)				3 - Prevalence Index is ≤3.0¹
1				4 - Morphological Adaptations¹ (Provide supporting
2				data in Remarks or on a separate sheet)
3				Problematic Hydrophytic Vegetation¹ (Explain)
4				
5				Indicators of hydric soil and wetland hydrology must
6				be present, unless disturbed or problematic.
		= Total Cov	er er	Definitions of Five Vegetation Strata:
50% of total cover:	20% of	total cover		_
Herb Stratum (Plot size:)				Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in.
1. SEDGE (CAREX SP.)	7	455	FACW)+	
			7 1700 1	
2				Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less
3				than 3 in. (7.6 cm) DBH.
4				
5				Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.
6				approximatory of the annual first the annual first
7				Herb – All herbaceous (non-woody) plants, including
8		-		herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3
9				ft (1 m) in height.
10				Woody vine - All woody vines, regardless of height,
11				1100dy Ville – All Woody Villes, regardless of figight.
		= Total Cov	/er	
50% of total cover:/	20% of	total cover	0.4	
Woody Vine Stratum (Plot size:)	20 /8 0	TOTOL COTOL		
1. HONEYSUCKLE (LONICERA JAPONICA)	7	400	FAC.	
2				
3				
4				
				Hydrophytic
5				i trat terrette
5	2	= Total Co	ver	Vegetation
5		= Total Co f total cover		Vegetation Present? Yes No

Sampling Point: 483

Profile Des	cription: (Describe	to the dep				or confirm	n the absen	ce of I ndicat	ors.)	
Depth	Matrix		Redo	x Features	<u> </u>	. 2			~ .	
(inches)	Color (moist)	%	Color (moist)		Type ¹		Texture		Remarks	
0-3	7.54R 6/2	70	7.5 YR 5/6	30		<u> </u>	SICLL	<u>,0</u>		
3-12	104R 7/1	80	7.5 YR 5/6	20						
			\\\ <u></u>		-					
			10		-					
					-					
								_	_	
			// <u>-</u>							
			0							
¹Type: C=C	Concentration, D=Dep	letion RM	=Reduced Matrix M	S=Masked	Sand Gr	ains	²Location:	PL=Pore Lir	ning, M=Matrix.	
Hydric Soil		nedon, Islan	- Neddoed Watrix, IN	O WIGHTON	Caria Ci	ano.			Problematic Hy	dric Solis³:
Histoso			Dark Surface	e (S7)					(A10) (MLRA 14	1
	pipedon (A2)		Polyvalue Be		ce (S8) (8	/ILRA 147,	, 148)		ie Redox (A16)	-
Black H	listic (A3)		Thin Dark Su	ırface (S9)	(MLRA			(MLRA 1		_
	en Sulfide (A4)		Loamy Gleye		F2)		_		loodplain Soils (F19)
_	d Layers (A5)		<u>✓</u> Depleted Me					(MLRA 1	i 36, 147) w Dark Surface	(TE12)
	uck (A10) (LRR N) d Below Dark Surfac	α (Δ11)	Redox Dark Depleted Da						lain in Remarks)	
	ark Surface (A12)	9 (211)	Redox Depre				-	. • (—		
	Mucky Mineral (S1) (L	LRR N,	Iron-Mangan		•	LRR N,				
	A 147, 148)		MLRA 13							
	Gleyed Matrix (S4)		Umbric Surfa						hydrophytic veg	
	Redox (S5)		Piedmont Flo					_	rology must be p bed or problema	
	d Matrix (S6) Layer (If observed):		Red Parent I	viatenai (F	21) (MILK	CA 127, 14	17)	uriess distai	ded of prodierna	RIG.
	NONE.	•								
							Hudric 9	oil Present?	Yes 🗸	No
	ches):						Tiyoric C	OII T TOGOTIC	100	
Remarks:										

Project/Site: MITIGATION AREA- WETLAND E City/County: ON	Sampling Date: 2/19/14
Project/Site: MITIGATION AREA- WETLAND E City/County: ON Applicant/Owner: ARMSTRONG COM CO WARDEN WASTE SITE	State: KY Sampling Point: WP 568
Investigator(s): BILL SAMPSON, TOHN BOTTOM Section, Township,	
Landform (hillslope, terrace, etc.): FLOOD PARIN Local relief (concave, o	convex, none): CONCAVE Slope (%): 42%
Subregion (LRR or MLRA): LRR N Let: 37°24' 23.3 L	ong: 87° 03' 46.5" Datum: 66584
	NWI classification:PF01B
Are climatic / hydrologic conditions on the site typical for this time of year? Yes No	The same of the sa
	re "Normal Circumstances" present? Yes No
	f needed, explain any answers in Remarks.)
SUMMARY OF FINDINGS – Attach site map showing sampling poin	
Hydrophytic Vegetation Present? Yes No [s the Samp	ied Area
Hydric Soil Present? Yes No within a Wes	tland? Yes No
Wetland Hydrology Present? Yes No	
Remarks: Two SEPARATE WETLAND AREAS AT WEST SIDE OF APTACENT TO WETLAND E.	mer to the following the man and the man a
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)	Surface Soll Cracks (B6)
✓ Surface Water (A1) True Aquatic Plents (B14)	Sparsely Vegetated Concave Surface (B8)
High Water Table (A2) Hydrogen Sulfide Odor (C1)	Drainage Patterns (B10)
Water Marks (B1) Presence of Reduced Iron (C4)	Dry-Season Water Table (C2)
Sediment Deposits (B2) Recent Iron Reduction In Tilled Soi	
Drift Deposits (B3) Thin Muck Surface (C7)	Saturation Visible on Aerial Imagery (C9)
Algal Mat or Crust (B4) Other (Explain in Remarks)	Stunted or Stressed Plants (D1) Geomorphic Position (D2)
Iron Deposits (B5) Inundation Visible on Aerial Imagery (B7)	Shallow Aquitard (D3)
✓ Water-Stained Leaves (B9)	Microtopographic Relief (D4)
Aquatic Fauna (B13)	FAC-Neutral Test (D5)
Field Observations:	
Surface Water Present? Yes No Depth (inches):	
Water Table Present? Yes No Depth (inches):	
Saturation Present? Yes V No Depth (Inches):	Wetland Hydrology Present? Yes V No
(includes capillary fringe)	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspecti	ions), if available:
Remarks:	

Sampling Point: WP 5/8

	Absolute	Dominant	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: 30')	% Cover	Species?	Status	Number of Dominant Species
1. SYCAMORE (PLATANUS OCCIDENTALIS)	10	No_	FACW	That Are OBL, FACW, or FAC:
2. SWEETEUM (LIQUIDAMBAR STYRACIFLAA)	25	YES	FAC	
3. RED MAPLE (ACER RUBRUM)				Total Number of Dominant Species Across All Strata: (B)
			21100	Species Across All Strata: (B)
4				Percent of Dominant Species
5				That Are OBL, FACW, or FAC: 83 (A/B)
6				Prevalence Index worksheet:
	<u>55</u>	= Total Cov	er	
50% of total cover: _2.7.1	20% nt	total cover:	11	Total % Cover of: Multiply by:
Sapilno Stratum (Plot size: _/5')		IDUAL ODTER		OBL species x 1 =
1. RED MAPLE (ACER RUBRUM)	-	Un	FOR	FACW species x 2 =
I				FAC species x 3 =
2				FACU species x 4 =
3				UPL species x 5 =
4				Column Totals: (A) (B)
5				Column 15tales (5)
6				Prevalence Index = B/A =
		= Total Cov	er	Hydrophytic Vegetation Indicators:
				_ 1 - Rapid Test for Hydrophytic Vegetation
50% of total cover: 2.5	20% of	TOTAL COVER		✓ 2 - Dominance Test is >50%
Shrub Stratum (Plot size:)			1	
1				3 - Prevalence Index is ≤3.01
2	,			4 - Morphological Adaptations (Provide supporting data in Remarks or on a separate sheet)
3				
4				Problematic Hydrophytic Vegetation1 (Explain)
5				
				¹ Indicators of hydric soll and wetland hydrology must
6		T		be present, unless disturbed or problematic.
		= Total Cov		Definitions of Five Vegetation Strata:
50% of total cover:	20% o	f total cover:		Tree – Woody plants, excluding woody vines,
Herb Stratum (Plot size:5/)				tree - troody promoting troody times,
				approximately 20 ft (6 m) or more in height and 3 in.
1. SEDGE (CAREY SP.)	2	YES	FACNY	approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).
1. SEDGE (CAREY SP.)	2	YES YES	FACW+	(7.6 cm) or larger in diameter at breast height (DBH).
1. SEDGE (CARGY SP.) 2. CHRISTMAS FERN (P. ACROSTRICHOLDES)	2	725	FACU	(7.6 cm) or larger in diameter at breast height (DBH). Sapling – Woody plants, excluding woody vines,
1. SEDGE (CAREY SP.)	2	725	FACU	(7.6 cm) or larger in diameter at breast height (DBH). Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less
1. SEDGE (CAREY SP.) 2. CHRISTMAS FERN (P. ACROSTRICHOIDES) 3. 4.		<u>-925</u>	<i>FACU</i>	(7.6 cm) or larger in diameter at breast height (DBH). Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.
1. SEDGE (CAREY SP.) 2. CHRISTMAS FERN (P. ACRUSTRICHOIDES) 3.		<u>-925</u>	<i>FACU</i>	(7.6 cm) or larger in diameter at breast height (DBH). Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub – Woody plants, excluding woody vines,
1. SEDGE (CAREY SP.) 2. CHRISTMAS FERN (P. ACROSTRICHOIDES) 3. 4.		<u>-925</u>	<i>FACU</i>	(7.6 cm) or larger in diameter at breast height (DBH). Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.
1. SEDGE (CAREY SP.) 2. CHRISTMAS FERN (P. ACROSTRICHOLDES) 3. 4.			<i>FACU</i>	(7.6 cm) or larger in diameter at breast height (DBH). Septing — Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub — Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb — All herbaceous (non-woody) plants, including
1. SEDGE (CAREY SP.) 2. CHRISTMAS FERN (P. ACROSTRICHOLDES) 3. 4. 5. 6. 7.			<i>FACU</i>	(7.6 cm) or larger in diameter at breast height (DBH). Sepling — Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub — Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb — All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody
1. SEDGE (CAREY SP.) 2. CHRISTMAS FERN (P. ACROSTRICHOLDES) 3. 4. 5. 6. 7.		725	<i>FACU</i>	(7.6 cm) or larger in diameter at breast height (DBH). Sapling — Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub — Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb — All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3
1. SEDGE (CARGY SP.) 2. CHRISTMAS FERN (P. ACROSTRICHOIDES) 3. 4. 5. 6. 7. 8. 9.			<i>FACU</i>	(7.6 cm) or larger in diameter at breast height (DBH). Sepling — Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub — Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb — All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody
1. SEDGE (CAREX SP.) 2. CHRISTMAS FERN (P. ACROSTRICHOLDES) 3. 4. 5. 6. 7. 8. 9.			<i>FACU</i>	(7.6 cm) or larger in diameter at breast height (DBH). Sapling — Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub — Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb — All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3
1. SEDGE (CAREY SP.) 2. CHRISTMAS FERN (P. ACROSTRICHOIDES) 3. 4. 5. 6. 7. 8. 9.			<i>FACU</i>	(7.6 cm) or larger in diameter at breast height (DBH). Sapling — Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub — Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb — All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.
1. SEDGE (CAREY SP.) 2. CHRISTMAS FERN (P. ACRUSTRICHOIDES) 3. 4. 5. 6. 7. 8. 9. 11.		= Total Cov	FACU	(7.6 cm) or larger in diameter at breast height (DBH). Sapling — Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub — Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb — All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.
1. SEDGE (CAREX SP.) 2. CHRISTMAS FERN (P. ACROSTRICHOLDES) 3. 4. 5. 6. 7. 8. 9. 10. 11.		= Total Cov	FACU	(7.6 cm) or larger in diameter at breast height (DBH). Sapling — Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub — Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb — All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.
1. SEDGE (CARGY SP.) 2. CHRISTMAS FERN (P. ACROSTRICHOLDES) 3. 4. 5. 6. 7. 8. 9. 10. 11. 50% of total cover. 2		= Yes	FACU	(7.6 cm) or larger in diameter at breast height (DBH). Sapling — Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub — Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb — All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.
1. SEDGE (CAREX SP.) 2. CHRISTMAS FERN (P. ACROSTRICHOLDES) 3. 4. 5. 6. 7. 8. 9. 10. 11.		= Yes	FACU	(7.6 cm) or larger in diameter at breast height (DBH). Sapling — Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub — Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb — All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.
1. SEDGE (CARGY SP.) 2. CHRISTMAS FERN (P. ACROSTRICHOLDES) 3. 4. 5. 6. 7. 8. 9. 10. 11. 50% of total cover		= Total Cover	FACU	(7.6 cm) or larger in diameter at breast height (DBH). Sapling — Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub — Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb — All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.
1. SEDGE (CAREY SP.) 2. CHRISTMAS FERN (P. ACROSTRICHOLDES) 3. 4. 5. 6. 7. 8. 9. 10. 11. 50% of total cover. Z Woody Vine Stratum (Plot size: 5') 1. HONEYSHCKLE (CONICERA JAPONICA) 2.	2 	= Total Cover	FACU	(7.6 cm) or larger in diameter at breast height (DBH). Sapling — Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub — Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb — All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.
1. SEDGE (CARGY SP.) 2. CHRISTMAS FERN (P. ACROSTRICHOLDES) 3. 4. 5. 6. 7. 8. 9. 10. 11. 50% of total cover. Z Woody Vine Stratum (Plot size: 5') 1. HONGYSHCKLE (LONICERA TAPONICA) 2. 3.	2 	= Total Cover	FACU	(7.6 cm) or larger in diameter at breast height (DBH). Sapling — Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub — Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb — All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.
1. SEDGE (CAREY SP.) 2. CHRISTMAS FERN (P. ACROSTRICHOLDES) 3. 4. 5. 6. 7. 8. 9. 11. 11. 50% of total cover. 2 Woody Vine Stratum (Plot size: 5') 1. HONEYSHCKLE (CONICERA JAPONICA) 2. 3. 4.		= Total Cover	FACU	(7.6 cm) or larger in diameter at breast height (DBH). Sapling — Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub — Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb — All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.
1. SEDGE (CARGY SP.) 2. CHRISTMAS FERN (P. ACROSTRICHOLDES) 3. 4. 5. 6. 7. 8. 9. 10. 11. 50% of total cover. Z Woody Vine Stratum (Plot size: 5') 1. HONEYSHCKLE (LONICERA STAPONICA) 2. 3.		= Total Cover	FACU	(7.6 cm) or larger in diameter at breast height (DBH). Sapling — Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub — Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb — All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height. Woody vine — All woody vines, regardless of height.
1. SEDGE (CAREY SP.) 2. CHRISTMAS FERN (P. ACROSTRICHOLDES) 3. 4. 5. 6. 7. 8. 9. 10. 11. 50% of total cover. Z Woody Vine Stratum (Plot size: 5') 1. HONEYSHCKLE (LONICERA TAPONICA) 2. 3. 4. 5.	2 	= Total Cover	FACU	(7.6 cm) or larger in diameter at breast height (DBH). Sapling — Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub — Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb — All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height. Woody vine — All woody vines, regardless of height. Hydrophytic Vegetation
1. SEDGE (CARGY SP.) 2. CHRISTMAS FERN (P. ACROSTRICHOLDES) 3. 4. 5. 6. 7. 8. 9. 10. 11. 50% of total cover. 2 Woody Vine Stratum (Plot size: 5') 1. HONGYSHCKLE (CONICERA JAPONICA) 2. 3. 4.	2 	= Total Cover	FACU	(7.6 cm) or larger in diameter at breast height (DBH). Sapling — Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub — Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb — All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height. Woody vine — All woody vines, regardless of height.
1. SEDGE (CAREY SP.) 2. CHRISTMAS FERN (P. ACROSTRICHOLDES) 3. 4. 5. 6. 7. 8. 9. 10. 11. 50% of total cover. Z Woody Vine Stratum (Plot size: 5') 1. HONEYSACKLE (LONICERA TAPONICA) 2. 3. 4. 5.	2 20% o	= Total Cover	FACU	(7.6 cm) or larger in diameter at breast height (DBH). Sapling — Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Shrub — Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb — All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height. Woody vine — All woody vines, regardless of height. Hydrophytic Vegetation

Control of the contro		to the dept				or confirm	i the abs	ence of indicators.)	
Depth (inches)	Matrix Color (moist)	%	Color (moist)	x Features	_Type ¹	Loc ²	Textu	Remarks	
0-4	104R 5/2		54R 4/6			M	SICI	60	
	1011 3/0	00	271.170				2000	BROWN W/TRACES OF	enau
4+								Trous w/ TRACES OF	G9E.FIT
	-						-		
					-		V -		
	-								
	O 	(i 			-				
¹Type: C=Ce	oncentration, D=Dep	letion, RM=l	Reduced Matrix, M	S=Masked	Sand Gr	ains.		n: PL=Pore Lining, M=Matrix.	
Hydric Soll	Indicators:							ndicators for Problematic Hydric Sc	oils³:
Histosol	, ,		Dark Surface					2 cm Muck (A10) (MLRA 147)	
	pipedon (A2)		Polyvalue Be				, 148)	Coast Prairie Redox (A16)	
Black Hi			Thin Dark St			47, 148)		(MLRA 147, 148) Piedmont Floodplain Soils (F19)	
	n Sulfide (A4) 1 Layers (A5)		Loamy Gley		F2)			(MLRA 136, 147)	
	ick (A10) (LRR N)		Redox Dark		6)			Very Shallow Dark Surface (TF12)	ı)
	Below Dark Surface	e (A11)	Depleted Da					Other (Explain in Remarks)	•
	ark Surface (A12)		Redox Depr						
-	lucky Mineral (S1) (L	.RR N,	lron-Mangar		es (F12) (LRR N,			
	147, 148)		MLRA 13					3. (1 -46 bdb4:	
	Bleyed Matrix (S4)		Umbric Surfa				491	³ Indicators of hydrophytic vegetation wetland hydrology must be present	
	ledox (S5) Matrix (S6)		Red Parent					unless disturbed or problematic.	٠,
	_ayer (if observed):		110011 010111	(viotaliai (i	_		1		
	NONE								
	ches):						Hydrk	Soll Present? Yes No _	11
Remarks:									

Project/Site: MITIGATION AREA- WETLAND F CIT	y/County: OHIO Sampling Date: Z/19/14
	THE SITE State: KY Sampling Point: NP 656
Investigator(s): BILL SAMPSON, JOHN BOTTOM SE	
Landform (hillslope, terrace, etc.): FLOODPLAIN Local	relief (concave, convex, none): CONCAVE Slope (%): 4 Z
Subregion (LRR or MLRA): 4RR N Lat 37" Z3" 59	.8" Long: 87° 63' 33.4" Datum: W65 84
Soll Map Unit Name: BONNIE SILT COAM	NWI classification: PF01B
Are climatic / hydrologic conditions on the site typical for this time of year?	
Are Vegetation, Soil, or Hydrology significantly dis	
Are Vegetation, Soil, or Hydrology naturally proble	·-
rie vegetation, soil, or rivatology rietatially proble	illiands (illiands, sopiali ally allowed illiands)
SUMMARY OF FINDINGS – Attach site map showing s	ampling point locations, transects, important features, etc.
Hydrophytic Vegetation Present? Yes No	is the Sampled Area
Hydric Soil Present? Yes No	within a Wetland? Yes No
Wetland Hydrology Present? Yes No	
3/4 is 15 wide, cower 1/4 is 20' a	AND DOWNSTREAM WP'S OF 716 \$717; UPPER
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)	Surface Soll Cracks (B6)
Surface Water (A1) True Aquatic Plan	
High Water Table (A2) Hydrogen Sulfide	
I —	heres on Living Roots (C3) V Moss Trim Lines (B16)
Water Marks (B1) Presence of Redu	
_ · · · · - ·	ction in Tilled Soils (C6)
Drift Deposits (B3) Thin Muck Surfac	
Algel Mat or Crust (B4) Other (Explain in I	
Iron Deposits (B5)	Geomorphic Position (D2)
inundation Visible on Aerial Imagery (B7)Water-Stained Leaves (B9)	Shallow Aquitard (D3) Microtopographic Relief (D4)
1 - · · ·	iniciotopografino Callet (U-7) FAC-Neutral Test (D5)
Aquatic Fauna (B13) Field Observations:	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
Water Table Present? Yes No Depth (Inches): _ Saturation Present? Yes No Depth (Inches): _	
Saturation Present? Yes No Depth (Inches): _ (includes capillary fringe)	Yeadand Hydrology Present? 165 / NO
Describe Recorded Data (stream gauge, monitoring well, aerial photos,	previous inspections), if available:
Remarks:	

VEGETATION (Five Strata) – Use scientific na	mes of	olants.		Sampling Point: 656
_ ,		Dominant		Dominance Test worksheet:
		Species?		Number of Dominant Species
1. RIVER BIRCH (BETWIA NIERA)				That Are OBL, FACW, or FAC: (A)
2. SWEETENM (LIGHIDAMBAR STYRACIFLUA)				Total Number of Dominant
3	10	YES	FACW	Species Across All Strata: (B)
4				Percent of Deminant Species
5				Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)
6.				, ,
	35	= Total Cov	er	Prevalence Index worksheet:
50% of total cover:				Total % Cover of: Multiply by:
	20% 01	total cover.		OBL species x 1 =
Sapling Stratum (Plot size:)		0	-11	FACW species x 2 =
1. JWEETGUM (LIQUIDAMBAR STYRACIFINA			FAC	FAC species x 3 =
2				FACU species x 4 =
3				UPL species x 5 =
4				Column Totals: (A) (B)
5				(5)
6				Prevalence Index = B/A =
		= Total Cov	er	Hydrophytic Vegetation Indicators:
50% of total cover:				1 - Rapid Test for Hydrophytic Vegetation
	20% 01	total cover:		✓ 2 - Dominance Test is >50%
Shrub Stratum (Plot size:)				3 - Prevalence Index is ≤3.01
1				
2			-	4 - Morphological Adaptations' (Provide supporting data in Remarks or on a separate sheet)
3		-		Problematic Hydrophytic Vegetation1 (Explain)
4				I Tobiolitica i Tyorophysis Vogetation (Explain)
5				Indicators of hydric soil and wetland hydrology must
6				be present, unless disturbed or problematic.
		= Total Cov	er	Definitions of Five Vegetation Strata:
50% of total cover:	200/ =4	total cover		Delinion of the regulation as acar
Herb Stratum (Plot size:)	20%01	Wai Cover.		Tree – Woody plants, excluding woody vines,
Herb Stratum (Plot \$126: 5		12.	#E441	approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).
1. SEDGE (CAREX SP.)	23	/23	PACWE	(1.0 bill) of folgot in alculator of product religite (polity)
2				Sapling – Woody plants, excluding woody vines,
3				approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.
4				
5				Shrub – Woody plants, excluding woody vines,
6				approximately 3 to 20 ft (1 to 6 m) in height.
7				Herb - All herbaceous (non-woody) plants, including
8				herbaceous vines, regardless of size, and woody
9				plants, except woody vines, less than approximately 3 ft (1 m) in height.
10				(L) (III)
11.				Woody vine - All woody vines, regardless of height.
	75	= Total Cov		
50% of total cover: /z.5	20% of	f total cover	:_2	
Woody Vine Stratum (Plot size: 5")				
1				
2				
3				
4				
5				1111
		= Total Cov	/er	Hydrophytic Vegetation
****	-			Present? Yes No
50% of total cover:	3-1-1-1-1-1-1	r total cover		
Remarks: (Include photo numbers here or on a separate s	sheet.)			

epth Matrix		x Features	Type ¹	Loc ²	Tavius	Remarks
ches) Color (maist) %	Color (moist)					3000.000.000.000.000.000.000.000.000.00
-10 1042 5/2 65	54R. 4/6	35	<u>C</u>	M	5i CL 4	
	0					
			-			
	0.					
				concession to	-	
be: C=Concentration, D=Depletion, RM	=Reduced Matrix, M	S=Masked S	Sand Gra	ins.		n: PL=Pore Lining, M=Matrix.
ric Soil Indicators:					Ir	idicators for Problematic Hydric Soils ³ :
Histosol (A1)	Dark Surface				_	_ 2 cm Muck (A10) (MLRA 147)
Histic Epipedon (A2)	Polyvalue Bo				, 148} _	_ Coast Prairie Redox (A16)
Black Histic (A3)	Thin Dark St Loamy Gley			17, 148)		(MLRA 147, 148) Piedmont Floodplain Soils (F19)
Hydrogen Sulfide (A4) Stratified Layers (A5)	Depleted Ma		۷)		_	(MLRA 136, 147)
2 cm Muck (A10) (LRR N)	Redox Dark)		_	Very Shallow Dark Surface (TF12)
Depleted Below Dark Surface (A11)	Depleted Da				_	Other (Explain in Remarks)
Thick Dark Surface (A12)	Redox Depr					
Sandy Mucky Mineral (S1) (LRR N,	Iron-Mangar		s (F12) (L	.RR N,		
MLRA 147, 148) Sandy Gleyed Matrix (S4)	MLRA 13					_
Saridy Gleyed Mainx 1541		/-171/84	H DA 426	1221		Indicators of hydrophytic vacatation and
		ace (F13) (M codolain Sci			481	³ Indicators of hydrophytic vegetation and wetland hydrology must be present.
Sandy Redox (S5)	Ombre Sun	oodplain Soi	ls (F19) (MLRA 1		Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
	Piedmont FI	oodplain Soi	ls (F19) (MLRA 1		wetland hydrology must be present,
Sandy Redox (S5) Stripped Matrix (S6)	Piedmont FI Red Parent	oodplain Soi	ls (F19) (MLRA 1		wetland hydrology must be present,
Sandy Redox (S5) Stripped Matrix (S6) trictive Layer (if observed): Type:	Piedmont FI Red Parent	oodplain Soi	ls (F19) (MLRA 1	7)	wetland hydrology must be present,
Sandy Redox (S5) Stripped Matrix (S6) trictive Layer (if observed): Type:	Piedmont FI Red Parent	oodplain Soi	ls (F19) (MLRA 1	7)	wetland hydrology must be present, unless disturbed or problematic.
Sandy Redox (S5) Stripped Matrix (S6) trictive Layer (if observed):	Piedmont FI Red Parent	oodplain Soi	ls (F19) (MLRA 1	7)	wetland hydrology must be present, unless disturbed or problematic.
Sandy Redox (S5) Stripped Matrix (S6) trictive Layer (if observed): Type:	Piedmont FI Red Parent	oodplain Soi	ls (F19) (MLRA 1	7)	wetland hydrology must be present, unless disturbed or problematic.
Sandy Redox (S5) Stripped Matrix (S6) trictive Layer (if observed): type:	Piedmont FI Red Parent	oodplain Soi	ls (F19) (MLRA 1	7)	wetland hydrology must be present, unless disturbed or problematic.
Sandy Redox (S5) Stripped Matrix (S6) trictive Layer (if observed): type:	Piedmont FI Red Parent	oodplain Soi	ls (F19) (MLRA 1	7)	wetland hydrology must be present, unless disturbed or problematic.
Sandy Redox (S5) Stripped Matrix (S6) trictive Layer (if observed): type:	Piedmont FI Red Parent	oodplain Soi	ls (F19) (MLRA 1	7)	wetland hydrology must be present, unless disturbed or problematic.
Sandy Redox (S5) Stripped Matrix (S6) trictive Layer (if observed): type:	Piedmont FI Red Parent	oodplain Soi	ls (F19) (MLRA 1	7)	wetland hydrology must be present, unless disturbed or problematic.
Sandy Redox (S5) Stripped Matrix (S6) trictive Layer (if observed): type:	Piedmont FI Red Parent	oodplain Soi	ls (F19) (MLRA 1	7)	wetland hydrology must be present, unless disturbed or problematic.
Sandy Redox (S5) Stripped Matrix (S6) trictive Layer (if observed): type:	Piedmont FI Red Parent	oodplain Soi	ls (F19) (MLRA 1	7)	wetland hydrology must be present, unless disturbed or problematic.
Sandy Redox (S5) Stripped Matrix (S6) trictive Layer (if observed): type:	Piedmont FI Red Parent	oodplain Soi	ls (F19) (MLRA 1	7)	wetland hydrology must be present, unless disturbed or problematic.
Sandy Redox (S5) Stripped Matrix (S6) trictive Layer (if observed): type:	Piedmont FI Red Parent	oodplain Soi	ls (F19) (MLRA 1	7)	wetland hydrology must be present, unless disturbed or problematic.
Sandy Redox (S5) Stripped Matrix (S6) trictive Layer (if observed): type:	Piedmont FI Red Parent	oodplain Soi	ls (F19) (MLRA 1	7)	wetland hydrology must be present, unless disturbed or problematic.
Sandy Redox (S5) Stripped Matrix (S6) trictive Layer (if observed): type:	Piedmont FI Red Parent	oodplain Soi	ls (F19) (MLRA 1	7)	wetland hydrology must be present, unless disturbed or problematic.
Sandy Redox (S5) Stripped Matrix (S6) trictive Layer (if observed): Type:	Piedmont FI Red Parent	oodplain Soi	ls (F19) (MLRA 1	7)	wetland hydrology must be present, unless disturbed or problematic.
Sandy Redox (S5) Stripped Matrix (S6) trictive Layer (if observed): Type:	Piedmont FI Red Parent	oodplain Soi	ls (F19) (MLRA 1	7)	wetland hydrology must be present, unless disturbed or problematic.
Sandy Redox (S5) Stripped Matrix (S6) trictive Layer (if observed): ype:	Piedmont FI Red Parent	oodplain Soi	ls (F19) (MLRA 1	7)	wetland hydrology must be present, unless disturbed or problematic.
Sandy Redox (S5) Stripped Matrix (S6) trictive Layer (if observed): Type:	Piedmont FI Red Parent	oodplain Soi	ls (F19) (MLRA 1	7)	wetland hydrology must be present, unless disturbed or problematic.
Sandy Redox (S5) Stripped Matrix (S6) trictive Layer (if observed): Type:	Piedmont FI Red Parent	oodplain Soi	ls (F19) (MLRA 1	7)	wetland hydrology must be present, unless disturbed or problematic.
Sandy Redox (S5) Stripped Matrix (S6) trictive Layer (if observed): Type:	Piedmont FI Red Parent	oodplain Soi	ls (F19) (MLRA 1	7)	wetland hydrology must be present, unless disturbed or problematic.
Sandy Redox (S5) Stripped Matrix (S6) trictive Layer (if observed): type:	Piedmont FI Red Parent	oodplain Soi	ls (F19) (MLRA 1	7)	wetland hydrology must be present, unless disturbed or problematic.

Project/Site: MITIGATION	AREA- WETE	AND G City/C	County: OHIO	Sampling Date: 2/20/	114		
Applicant/Owner: PRMSTRE	wa Cope Co.	WARDEN WAS	TE SITE	State: Ky Sampling Point: WP	720		
				ne): _concave Slope (%): _	_z_		
Subregion (LRR of MLRA):	LRRN 1:	at: 370 24'0	6.4" Long:	87°03' 37.0" Datum: NGS	84		
Soll Map Unit Name: Box				NWI classification: PF01B			
Are climatic / hydrologic condit				(If no, explain in Remarks.)			
Are Vegetation, Soil		_		Circumstances" present? Yes No.			
Are Vegetation, Soil _				explain any answers in Remarks.)			
			, .				
SUMMARY OF FINDIN	GS Attach site	map showing san	npling point location	ons, transects, important features	, etc.		
Hydrophytic Vegetation Pres	ent? Yes 🗸		is the Sampled Area				
Hydric Soil Present?	Yes_V	No	within a Wetland?	Yes No			
Wetland Hydrology Present?	Yes 🗸	No					
Remarks:							
		450					
HYDROLOGY							
Wetland Hydrology Indicat		100 100		Secondary Indicators (minimum of two requ	ired)		
Primary Indicators (minimum				Surface Soll Cracks (B6)			
✓ Surface Water (A1)		_ True Aquatic Plants		Sparsely Vegetated Concave Surface (B8)			
High Water Table (A2)		_ Hydrogen Sulfide Oc		✓ Drainage Patterns (B10) ✓ Moss Trim Lines (B16)			
✓ Saturation (A3)		 Oxidized Knizospher Presence of Reduce 	res on Living Roots (C3)	Dry-Season Water Table (C2)			
Water Marks (B1) Sediment Deposits (B2)		Recent Iron Reduction		Crayfish Burrows (C8)			
Orifit Deposits (B3)		Thin Muck Surface (Saturation Visible on Aerial Imagery (C	:9)		
Algal Mat or Crust (B4)	_	_ Other (Explain in Re		Stunted or Stressed Plants (D1)	"		
Iron Deposits (B5)	_		······································	Geomorphic Position (D2)			
Inundation Visible on As	rial Imagery (B7)			Shallow Aquitard (D3)			
Water-Stained Leaves (6	39)			Microtopographic Relief (D4)			
Aquatic Fauna (B13)				FAC-Neutral Test (D5)			
Field Observations:	4						
Surface Water Present?		Depth (inches):					
Water Table Present?	Yes No	Depth (inches):					
Saturation Present?	Yes V No	Depth (Inches):	Wettand	Hydrology Present? Yes 📈 No _			
(includes capillary fringe) Describe Recorded Data (str	eam gauge, monitorin	g well, aerial photos, pr	evious inspections), if av	ailable:			
3.30		560	100 W				
Remarks:							

VEGETATION (Five Strata) – Use scientific na	ames of	piants.		Sampling Point: 720	
- /	Absolute	Dominant		Dominance Test worksheet:	
Tree Stratum (Plot size: 30')		Species?		Number of Dominant Species	
1. SYCAMORE (PLATANUS OCCIDENTAUS)	20		FAC	That Are OBL, FACW, or FAC: (A)
2. PIN OAK (QUERCUS PALUSTRIS)	<u> 15 </u>	No		Total Number of Dominant	
3. JWAMP CHESTNUT OAK (Q. MICHAUXII)	10	No	FACW	Species Across All Strata:(B)
4. SWEETEUM (CIQUIDAMBAR STYRACIFLUA)		YES	FAC	Percent of Dominant Species	
5. RED MAPLE (ACER ROBBRUM)	5	No	FAC		A/B)
6					
	70	= Total Cov	er	Prevalence Index worksheet:	
50% of total cover: 35	20% of	total cover	14	Total % Cover of: Multiply by:	
Sapling Stratum (Plot size: _/5)				OBL species x 1 =	
1. RED MAPLE (A. RUBRUM	.5	425	FAC	FACW species x 2 =	
2				FAC species x 3 =	
3				FACU species x 4 =	
4				UPL species x 5 =	
				Column Totals: (A)	(B)
5	-			Prevalence Index = B/A =	
6		= Total Cov		Hydrophytic Vegetation Indicators:	•
				1 - Rapid Test for Hydrophytic Vegetation	
50% of total cover: 2.5	20% of	total cover	:	2 - Dominance Test is >50%	
Office Coatom (1 lot alza)	_			3 - Prevalence Index is ≤3.0 ¹	
1. IRUNWOOD (CARPINES CAROCINIANA)	_5_	7ES			
2. SPICEBUSH (LINDERA BENZOIN)			FAC	4 - Morphological Adaptations ¹ (Provide suppodata in Remarks or on a separate sheet)	gnung
3		<u> </u>		Problematic Hydrophytic Vegetation¹ (Explain)	1
4					,
5				¹ Indicators of hydric soil and wetland hydrology mu	ıet
6				be present, unless disturbed or problematic.	
	20	= Total Cov	/er	Definitions of Five Vegetation Strats:	
50% of total cover: /O	20% o	f total cover	:_4		
Herb Stratum (Plot size:)				Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in	n.
1. DEAD				(7.6 cm) or larger in diameter at breast height (DBI	H).
2				Sapling - Woody plants, excluding woody vines,	
3				approximately 20 ft (6 m) or more in height and les	38
4		W		than 3 in. (7.6 cm) DBH.	
5.		7 .5	-	Shrub - Woody plants, excluding woody vines,	
6				approximately 3 to 20 ft (1 to 6 m) in height.	
7				Herb - All herbaceous (non-woody) plants, includi	Ina
8				herbaceous vines, regardless of size, and woody	-
9				 plants, except woody vines, less than approximate if (1 m) in height. 	E yk
10				i ic (1 in) in neight.	
				Woody vine - All woody vines, regardless of height	ıht.
11		= Total Co	· · · · · · · · · · · · · · · · · · ·		
50% of total cover:	20% o	f total cover	<u></u>	•	
Woody Vine Stratum (Plot size:)					
1				-	
2					
3		-		•	
4					
5				Hydrophytic	
		= Total Co	ver	Vegetation	
50% of total cover:	20% o	f total cover	r:	Present? Yes No	
Remarks: (Include photo numbers here or on a separate					
	,				

	cription: (Describe	to the dep				or commi	n the absen	ce of marches	r 04.)	
Depth (inches)	Matrix Color (moist)	%	Color (moist)	x Features %	Type ¹	Loc²	Texture		Remarks	
	COID! (ITIQUY)		- (moiot)						CANIC LA	WER
0-2							- 4 1		C1101- 2.0	7 8.75
2-10	10 4R 6/1	60	54R 4/6	40		<u> M</u>	Silel	<u> </u>		
			-							
		• —		S						
				-				_\\\\		
					·			_		
-								_		
		. ——					-			
			-							-
								-8		
	concentration, D=Dep	letion, RM=	Reduced Matrix, M	S=Masked	Sand Gr	ains.			ing, M≕Matrix.	
Hydric Soil	Indicators:						Ind	icators for P	roblematic Hy	rdric Soils*;
Histoso	l (A1)		Dark Surface	, ,					A10) (MLRA 1	•
Histic E	pipedon (A2)		Polyvalue Be				', 148)	•	e Redox (A16)	
	istic (A3)		Thin Dark Su			147, 148)		(MLRA 14		
	en Sulfide (A4)		Loamy Gleye		F2)		_		oodpiain Solis	(F19)
Stratifie	d Layers (A5)		Depleted Me	trix (F3)				(MLRA 13		
2 cm M	uck (A10) (LRR N)		Redox Dark	Surface (F	6)		_		v Dark Surfece	
	d Below Dark Surfac	e (A11)	Depleted Da	rk Surface	(F7)		_	Other (Expla	ıln in Remerks)
Thick D	erk Surface (A12)		Redox Depre	esalons (Fi	8)					
Sandy N	Mucky Mineral (S1) (I	_RR N,	Iron-Mangan	ese Mass	es (F12) (LRR N,				
MLR	A 147, 148)		MLRA 13	(6)			_			
Sandy 0	Gleyed Matrix (S4)		Umbric Surfa						ydrophytic veg	-
Sandy F	Redox (S5)		Pledmont Flo					•	ology must be i	
Stripped	d Matrix (S6)		Red Parent I	Waterial (F	21) (MLR	A 127, 14	17)	uniess disturt	oed or problem	atic.
Restrictive	Layer (if observed):									
Туре:	NONE		M-12-39							
Depth (in	ches):						Hydric 8	oil Present?	Yes 🗸	No
Remarks:										
Nemarks.										

				Sampling Date: 3/10/14
Applicant/Owner: ARMSTI	CONG COAL CO.	- WARDEN WA.	STE 5176	State: KY Sampling Point: WP //
Investigator(s): Brez 54	MPSON, JOHN Z	<u> Во 1764</u> Secti	ion, Township, Range:	
Landform (hillislope, terrace, e	atc.): FLOODPLA	// Local re	lief (concave, convex, nor	ne): Slope (%):
Subregion (LRR or MLRA):	LREN L	st 37° 24' 10	.8" Long: 6	97°03' 42.6" Datum: NGS 84
Soil Map Unit Name:				NWI classification: PF0 1 B
Are climatic / hydrologic cond	ltions on the site typics	il for this time of year?	Yes No	(If no, explain in Remarks.)
Are Vegetation, Soil _	, or Hydrology _	significently distu	rbed? Are "Normal	l Circumstances" present? Yes No
Are Vegetation, Soil _				explain any answers in Remarks.)
SUMMARY OF FINDIN	IGS – Attach site	map showing sar	mpling point location	ons, transects, Important features, etc.
Hydrophytic Vegetation Pred	sent? Yes	No	is the Sampled Area	
Hydric Soll Present?	Yes _ $ u$	No	within a Wetland?	Yes No
Wetland Hydrology Present	? Yes <u>/</u>	No		
Remarks: CONSISTS OF	P SEVERAL WET	LAND AREAS NE	AR EACH OTHER,	INCLUPING AN OLD CHANNEL,
				("P"SHAPED); PLUS TWO
	on WETLAND			.,,,
7407-6. 7077-7-	550 65 67 67 77			
HYDROLOGY				
Wetland Hydrology Indica	tors:			Secondary Indicators (minimum of two required)
Primary Indicators (minimum	n of one is required; ch	eck all that apply)		Surface Soil Cracks (B6)
Surface Water (A1)		True Aquatic Plants		Sparsely Vegetated Concave Surface (B8)
High Water Table (A2)	_	Hydrogen Sulfide Od	dor (C1)	Drainage Patterns (B10)
Seturation (A3)			res on Living Roots (C3)	
Water Marks (B1)		Presence of Reduce	ed Iron (C4)	Dry-Season Water Table (C2)
Sediment Deposits (B2)		Recent Iron Reducti		Crayfish Burrows (C8)
Drift Deposits (B3)	_	Thin Muck Surface ((C7)	Saturation Visible on Aerial Imagery (C9)
Algai Mat or Crust (B4)	_	Other (Explain in Re	emarks)	Stunted or Stressed Plants (D1)
Iron Deposits (B5)				Geomorphic Position (D2)
Inundation Visible on Ar	arlat imagery (B7)			Shallow Aquitard (D3)
Water-Stained Leaves ((B9)			Microtopographic Relief (D4)
Aquatic Fauna (B13)				FAC-Neutral Test (D5)
Fleid Observations:				
Surface Water Present?		Depth (Inches):		
Water Table Present?		Depth (inches):		
Saturation Present?	Yes No	Depth (inches):	Wetland	Hydrology Present? Yes V No
(includes capillary fringe) Describe Recorded Data (st	ream oauge, monitorin	ια well, serial photos, pr	revious inspections), if av	ailable:
Describe (testificate base (at	roam gaage, monten	ig west, derical prioteer, p.	ovidao inopositorio,, ii =1	
Remarks:				
Remarks.				
1				
1				
1				

Iree Stratum (Plot size: 10')	Absolute % Cover	Dominant Species?		Dominance Test worksheet: Number of Dominant Species	
1. SWEET GUM (CIQUIDAMONR STYRIC IF LUA)			FAC	That Are OBL, FACW, or FAC: (A)	
2. RED MADLE (ACER RUBKUM)		485	FAC	Total Number of Dominant	
3. PIN OAK (QUERUS PAZUSTRIS)		No	FACW	Species Across All Strata:	
4. ELM (CHMUS AMERICANA)		YES_	FACW		
5				Percent of Dominant Species That Are OBL, FACW, or FAC: 85.7 (A/E	3)
6				Prevalence Index worksheet:	_
		= Total Cov		Total % Cover of: Multiply by:	
50% of total cover: 25	20% of	total cover	_/0_	OBL species x 1 =	
Sapling Stratum (Plot size: ///	5.4			FACW species x 2 =	
. SWEETGUM (C. STYRACIFLUA)		No_	FAC	FAC species x 3 =	
2. RED MARLE (A. RUBBUM)	15	YES.	FAC	FACU species x 4 =	
3				UPL species x 5 =	
4				Column Totals: (A) (B)
5		-		Prevalence Index = B/A =	
5		= Total Cov		Hydrophytic Vegetation indicators:	_
				1 - Rapid Test for Hydrophytic Vegetation	
50% of total cover: <u>//</u>	20% of	TOTAL COVER		2 - Dominance Test is >50%	
Shrub Stratum (Plot size:)	4.0	11-0		3 - Prevalence Index is ≤3.0°	
1 SPREENSH (LINDERA BENZOIN) 2. MULTIFLORA ROSE (ROSA MULTIFLARA)	5	No	FAC.	4 - Morphological Adaptations ¹ (Provide supporting	ng
3			7.70	data in Remarks or on a separate sheet)	Ť
4				Problematic Hydrophytic Vegetation¹ (Explain)	
5				¹ Indicators of hydric soll and wetland hydrology must	
6				be present, unless disturbed or problematic.	
		= Total Cov		Definitions of Five Vegetation Strata:	
50% of total cover: 7.5	20% of	total cover	<u> </u>	Tree - Woody plants, excluding woody vines,	
Herb Stratum (Plot size: 5')	-1	V-		approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).	
BUNCKBERRY (RUBUS SP.)				1	
2				Sapling - Woody plants, excluding woody vines,	
3				approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.	
ł				Shrub - Woody plants, excluding woody vines,	
5				approximately 3 to 20 ft (1 to 6 m) in height.	
· ·				Herb - All herbaceous (non-woody) plants, including	
3				herbaceous vines, regardless of size, and woody	
o o				plants, except woody vines, less than approximately	3
0				ft (1 m) in height.	
1				Woody vine - All woody vines, regardless of height.	
	_7	= Total Co	/er		
50% of total cover: _ 3 - 5					
Woody Vine Stratum (Plot size: _ 5)					
HONEY SUCKER (LONICERA JAPONICA)	1-2	YES	FAC		
2.					
3					
5			-		
-		= Total Co	ver	Hydrophytic Vegetation	
50% of total cover:	0.00			Present? Yes No	
30 /8 til total 60461/					
Remarks: (Include photo numbers here or on a separate :	sheet.)				

3UI	ᆫ

OIL									Sampling Point://_
rofile Des	scription: (Describe	to the dep	th needed	to docur	nent the in	ndicator	or confirm	m the absence o	of Indicators.)
Depth	Matrix			Redo	x Features	3			
i <u>nches)</u>	Color (moist)	%	Color (moist)	- %	Type	Loc ²	<u>Texture</u>	Remarks
0-2									BROWN CASER
	10 48 6/2	//	E VR	4/1	110	1	M	511/10	
2-10	101146	78-5 x 1=1 -x=1132							BROWN LAYER.
10+									DROWN CAYER
	-						-	•	
	· 1		***************************************					-	
	-								
	Concentration, D=Dep	Jeffer DM		NAMES NA		Cond C		21 cootlon: DI	=Pore Lining, M=Matrix.
	Indicators:	pietion, Ravi	-Reduceu	Matrix, M	5-iviaskeu	Sanu Gi	anis.		ntors for Problematic Hydric Solis ³ :
_			Do	de Quefano	· /87\				em Muck (A10) (MLRA 147)
Histoso Histos	pr(A1) Epipedon (A2)			rk Surface welve Re	low Surfac	ce (SR) (I	MLRA 141		oast Prairie Redox (A16)
_	fistic (A3)				ırface (S9)				(MLRA 147, 148)
	en Sulfide (A4)				d Matrix (,,		iedmont Floodplain Solls (F19)
	ed Layers (A5)			pleted Ms		-,		_	(MLRA 136, 147)
	luck (A10) (LRR N)		Re	dox Dark	Surface (F	6)			ery Shallow Dark Surface (TF12)
_ Deplete	ed Below Dark Surface	æ (A11)			rk Surface			_ ~	ther (Explain in Remarks)
	erk Surface (A12)				ssions (F				
	Mucky Mineral (S1) (LRR N,		_	ese Mass	es (F12)	(LRR N,		
	A 147, 148)			MLRA 13			4>	3ı	
-	Gleyed Matrix (S4)				ce (F13) (icators of hydrophytic vegetation and
	Redox (S5)				odplain S			•	ttand hydrology must be present, less disturbed or problematic.
	d Matrix (S6)		Re	a Parent I	Material (F	21) (MER	KA 147, 14	47) Urii	less disturbed of problemstic.
	Layer (if observed)	•							
	NONE								B
Depth (in	nches):							Hydric Soli	Present? Yes No
Remarks:									

- Maria lalesta to the	Aug 2 1 2 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Project/Site: MITICATION AREA - WETCAND I City/Coun	ty: OHIO Sampling Date: 3-10-14
Applicant/Owner ARMSTRONG CORE CO WARDEN WAS	
	Township, Range:
Landform (hillstope, terrace, etc.): FLOOPPLAIN Local relief (c	concave, convex, none): Slope (%):
Subregion (LRR or MLRA): LRR N Lat: 37° 24' 17.3'	Long: 87"03'37.9" Datum: WG584
Soil Map Unit Name: BONNIE SILT LORM	NWi classification: PF018
Are climatic / hydrologic conditions on the site typical for this time of year? Yes_	No (If no, explain in Remarks.)
Are Vegetation, Soil, or Hydrology significantly disturbed	
Are Vegetation, Soil, or Hydrology naturally problematic?	
SUMMARY OF FINDINGS – Attach site map showing sample	
Hydrophytic Vegetation Present? Yes V No le:	
1.4-ph/st spansor 15-ph/st 15	the Sampled Area thin a Wetland? Yes: V No
Wetland Hydrology Present? Yes V No	
Remarks:	
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary indicators (minimum of one is required; check all that apply)	Surface Soil Cracks (B6)
✓ Surface Water (A1) True Aquatic Plants (B14	
High Water Table (A2) Hydrogen Sulfide Odor (0	
✓ Saturation (A3) Oxidized Rhizospheres of	n Living Roots (C3) V Moss Trim Lines (B16)
Water Marks (B1) Presence of Reduced Iro	n (C4) Dry-Season Water Table (C2)
Sediment Deposits (B2) Recent from Reduction In	Tilled Soils (C6) Crayfish Burrows (C8)
Drift Deposits (B3) Thin Muck Surface (C7)	Saturation Visible on Aerial Imagery (C9)
Algel Mat or Crust (B4) Other (Explain in Remark	ss) Stunted or Stressed Plents (D1)
iron Deposits (B5)	Geomorphic Position (D2)
Inundation Visible on Aerial Imagery (B7)	Shallow Aquitard (D3)
✓ Water-Stained Leaves (B9)	Microtopographic Relief (D4)
Aquatic Feuna (B13)	FAC-Neutral Test (D5)
Field Observations:	
Surface Water Present? Yes No Depth (Inches):	_
Water Table Present? Yes No Depth (inches):	_
Saturation Present? Yes V No Depth (Inches):	
(includes capillary fringe)	
Describe Recorded Data (stream gauge , monitoring well, aerial photos, previous	us inspections), if available:
Remarks:	

'EGETATION (Five Strata) – Use scientific na	ames of	plants.		Sampling Point:// S
Tree Stratum (Plot size: 15') 1. RED MAPLE (ACER RUBRUM)		Dominant Species?	Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: (A)
2. PIN OAK (QUERCUS PALUSTRIS)	10		FACW	Total Number of Dominant
3. GREEN ASH (FRAXINUS PENNSTLVANICA) 4. RIVER BIRGH (BETOLA NIGRA)	5	No No	FACW.	Species Across All Strata:(B)
5. ELM (ULMUS AMERICANA)	5	No		Percent of Dominant Species That Are OBL, FACW, or FAC:
3	50	= Total Cov		Prevalence Index worksheet:
50% of total cover: 25				
Sapling Stratum (Plot size: 10') SWEETGUM (L. STYRACIFLUA)	8	Yes	=AC	FACW species x 2 =
PED MAPLE (A. RUBRUM)	15	Yes	FAC	FAC species x3 = FACU species x4 =
i				UPL species x 5 =
l b				Column Totals: (A) (B)
				Prevalence Index = B/A =
50% of total cover: ///.S		= Total Cov		Hydrophytic Vegetation Indicators: 1 - Rapid Test for Hydrophytic Vegetation
Shrub Stratum (Plot size:)	20% 01	total cover	710	∠ 2 - Dominance Test is >50%
•				3 - Prevalence Index is ≤3.0¹ 4 - Morphological Adeptations¹ (Provide supporting
). 				data in Remarks or on a separate sheet)
Name of the second seco				Problematic Hydrophytic Vegetation¹ (Explain)
5				¹ Indicators of hydric soil and wetland hydrology must
ь		= Total Co	ver	be present, unless disturbed or problematic. Definitions of Five Vegetation Strata:
50% of total cover Herb Stratum (Plot size:)				Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).
	-			Sepling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.
				Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.
				Herb - All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3
				ft (1 m) in height.
0 1				Woody vine - All woody vines, regardless of height.
		= Total Co		
S0% of total cover: Yoody Vine Stratum (Plot size:) HONEY SUCKLE (CONICERA TAPONICA)				
i	_<	- T-t-! O-		Hydrophytic
50% of total cover: ZrS	20% 0	= Total Co f total cove		Vegetation Present? Yes No
0070 01 total 00101. <u>2010</u>				1

6011	
JUII	

Sampling Point: 115

Profile Descript	ion: (Describe t	o the dep	th needed to docur	nent the i	ndicator	or confirm	n the absence	of indicato	rs.)	
Depth	Matrix			x Features	3				_	
(inches)	Color (moist)	%	Color (moist)	%	Type'	Log ²	<u>Texture</u>		Remarks	
0-3									SROWN LA	YER
3-10 11	241 6/2-	20	54R 4/6	20	C	M	Silito			
212 7	2710 0/2	00	211-10	-			DOC'S ST			
				NC 1000						
				-						
							e 			
/ 				m. C			-			
								_		
							101			
¹ Type: C=Conce	entration, D=Depl	etion, RM=	Reduced Matrix, M	S=Masked	Sand Gr	ains.	² Location: Pl	L=Pore Lini	ng, M=Matrix.	
Hydric Soil India									roblematic Hyd	dric Soils³:
Histosol (A1)			Dark Surface	(S7)			2	cm Muck (A10) (MLRA 14	17)
Histic Epiped			Polyvalue Be		ce (S8) (N	ILRA 147.			Redox (A16)	
Black Histic			Thin Dark Su					(MLRA 14		
Hydrogen St			Loamy Gleye			,/	Р	•	oodplain Soils (F19)
Strattfied Lay			✓ Depleted Ma		,		_	(MLRA 13		
	A10) (LRR N)		Redox Dark		6)		v		v Dark Surface	(TF12)
	low Dark Surface	(A11)	Depleted Da						in In Remarks)	
	Surface (A12)	, ,	Redox Depre							
	y Mineral (S1) (L	RR N.	Iron-Mangan			LRR N,				
MLRA 14		,	MLRA 13		. , ,	,				
	d Matrix (S4)		Umbric Surfa	,	MLRA 13	16, 122)	3Ind	icators of h	ydrophytic veg	etation and
Sandy Redo:			Piedmont Flo						ology must be p	
Stripped Mat			Red Parent I	-			-		ed or problema	
Restrictive Laye						•	İ		· · · · · · · · · · · · · · · · · · ·	
Type:/									,	
							Hydric Soll	Dracent?	Yes	No
):		_				riyane son	ricaciili	103_/	
Remarks:										

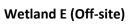
40	1.1-	- marie	Ou.		2-11-11/
Project/Site: MITIGATION	J AREA - WETLI	1ND City/C	County:	S	ampling Date: _ > 7/7/7
Applicant/Owner. ARMSTE					
Investigator(s): BILL SAN	IPSON, JOHN BO	Secti	on, Township, Range:		
Landform (hillslope, terrace, et	ic.): FLOOD PLA	Local rel	lef (concave, convex, no	ne): CONCAVE	Slope (%): 2 Z
Subregion (LRR or MLRA):					
Soil Map Unit Name:					on: PFO1B
Are climatic / hydrologic condi					
Are Vegetation, Soil _				l Circumstances" pre:	sent? Yes 📈 No
Are Vegetation, Soil _	, or Hydrology,	naturally problem	atic? (If needed, a	explain any answers i	in Remarks.)
SUMMARY OF FINDIN	GS – Attach site m	nap showing san	npling point location	ons, transects, i	mportant features, etc
Hydrophytic Vegetation Pres	ent? Yes	No	1- #- OI-I A		
Hydric Soil Present?	Yes V		Is the Sampled Area within a Wetland?	Yes V	No
Wetland Hydrology Present?		No			- 11 P
			(4.0.041.)	0 4.5-14	S AT SOUTHEAST
		ADVACENT, N	HEROW, LINEA	ic weighted	BOUINE()S)
PART OF S.	178,				
HYDROLOGY					
Wetland Hydrology Indicat	OFS:			Secondary Indicator	rs (minimum of two required)
Primary Indicators (minimum		k all that apply)		Surface Soil Cr	
Surface Water (A1)		True Aquatic Plants	(B14)		teted Concave Surface (B8)
High Water Table (A2)		Hydrogen Sulfide Od		Drainage Patte	
Saturation (A3)			es on Living Roots (C3)	Moss Trim Line	
Water Marks (B1)		Presence of Reduce		Dry-Season Wa	• •
Sediment Deposits (B2)		Recent Iron Reduction		Crayfish Burrow	· ·
Drift Deposits (B3)		Thin Muck Surface (ble on Aerial Imagery (C9)
Algal Mat or Crust (B4)	_	Other (Explain in Re	marks)	Stunted or Stre	essed Plants (D1)
Iron Deposits (B5)				Geomorphic Po	osition (D2)
Inundation Visible on Ae	rial Imagery (67)			Shallow Aquita	rd (D3)
Water-Stained Leaves (I	39)			Microtopograph	nlc Relief (D4)
Aquatic Fauna (B13)				FAC-Neutral Te	əst (D5)
Field Observations:					
Surface Water Present?	Yes 🖊 No	Depth (Inches):			
Water Table Present?	Yes No	Depth (inches):			,
Saturation Present?	Yes _/_ No	_ Depth (inches):	Wetland I	Hydrology Present?	? Yes No
(includes capillary fringe) Describe Recorded Data (str	eam gauge monitoring	well aerial photos pre	avious inspections) if gra	oilahla	
Describe recorded bata (str	cam gauge, monitoring v	well, aeriai priotos, pro	ovious inspections), il ave	andoro.	
Pomerke:					
Remarks:					

	Absolute	Dominant Indicator	Dominance Test worksheet:
Tree Stratum (Plot size:)	% Соуег	Species? Status	Number of Dominant Species
1. SYCAMORE (PLATANUS OCCIDENTACIS)	_5	NO FACK	That Are OBL, FACW, or FAC: (A)
2. RIVER BIRCH (BETULA NIGRA)	_5	NO FACH	Total Musels on of Description
3. RED MAPLE (ACER RUBRUM)	15	YES FAC	Total Number of Dominant Species Across All Strata:3
1. SWEETEUM (LIQUIDAMBAR STYRACIFLUE	8	YES FAC	
			Percent of Dominant Species
5		· · · · · · · · · · · · · · · · · · ·	That Are OBL, FACW, or FAC: _/OO (A/B)
0	7 2	= Total Cover	Prevalence Index worksheet:
			Total % Cover of: Multiply by:
50% of total cover: //	20% of	total cover: 6,6	OBL species x 1 =
Sapling Stratum (Plot size: 101)		ı	FACINA maning
. RED MAPLE (A. RUBRUM)	15	YES FAC	FAC species x 3 =
2			X 3
3			FACU species x4 =
1			UPL species x 5 =
5			Column Totals: (A) (B)
			Providence Index - P/A -
5			Prevalence Index = B/A =
		= Total Cover	Hydrophytic Vegetation Indicators:
50% of total cover:	20% of	total cover:	1 - Rapid Test for Hydrophytic Vegetation
Shrub Stratum (Plot size:)			2 - Dominance Test is >50%
1		·	3 - Prevalence Index is ≤3.0¹
2			4 - Morphological Adaptations ¹ (Provide supporting
3			data in Remarks or on a separate sheet)
			Problematic Hydrophytic Vegetation¹ (Explain)
4			
5			Indicators of hydric soil and wetland hydrology must
6			be present, unless disturbed or problematic.
		= Total Cover	Definitions of Five Vegetation Strata:
50% of total cover	20% of	total cover:	Tree – Woody plants, excluding woody vines,
Herb Stratum (Plot size:)			approximately 20 ft (6 m) or more in height and 3 in.
I. DEAD			(7.6 cm) or larger in diameter at breast height (DBH).
2			Sapling - Woody plants, excluding woody vines,
3.			approximately 20 ft (6 m) or more in height and less
			than 3 in. (7.6 cm) DBH.
<u>'</u>			Charles Microsity allows a confusion and a discount of
5			Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.
),			
			Herb - All herbaceous (non-woody) plants, including
3			herbaceous vines, regardless of size, and woody plents, except woody vines, less than approximately 3
0			ft (1 m) in height.
0			- No
1			Woody vine - All woody vines, regardless of height.
		= Total Cover	
50% of total cover.			
So or total cover:) Noody Vine Stratum (Plot size:)	20% 0	WEI WYEI	
. NONE			
2			
3			
l			.
5			Lhudranhudia
		= Total Cover	Hydrophytic Vegetation
			Present? Yes No
50% of total cover:	2007 -4	total agreem	Figsenti les140

Depth Matrix (inches) Color (moist)		Redo	x Features				
	%	Color (moist)		Type ¹	Loc ²	<u>Texture</u>	Remarks
0-10 7.5 YR 6/1	55 7	54R 5/6	45	C	M	SICL LO	SAME THROUGHOUT
Type: C=Concentration, D=Depliydric Soll Indicators:	letion, RM=Re	educed Matrix, M	S=Masked	Sand Gr	alns.		.=Pore Lining, M=Matrix. ttors for Problematic Hydric Soils ^a :
Histosol (A1)		Dark Surface					cm Muck (A10) (MLRA 147)
Histic Epipedon (A2)	,	Polyvalue Be				, 148) C	oast Prairie Redox (A16)
Black Histic (A3)		Thin Dark Su			47, 148)	Di	(MLRA 147, 148)
Hydrogen Sulfide (A4) Stratified Layers (A5)		Loamy Gleye Depleted Ma	-	-2)		_ P	iedmont Floodplain Soils (F19) (MLRA 136, 147)
2 cm Muck (A10) (LRR N)		Redox Dark		6)		Vi	ery Shallow Dark Surface (TF12)
Depleted Below Dark Surface	e (A11)	Depleted Da	-	-			ther (Explain in Remarks)
Thick Dark Surface (A12)		Redox Depre					
Sandy Mucky Mineral (S1) (L	RR N,	Iron-Mangan		ıs (F12) (LRR N,		
MLRA 147, 148)		MLRA 13			- 4	3	
Sandy Gleyed Matrix (S4)		Umbric Surfs					cetors of hydrophytic vegetation and
Sandy Redox (S5)		Piedmont Flo Red Parent I					tland hydrology must be present, ess disturbed or problematic.
Stripped Matrix (S6) lestrictive Layer (if observed):		Red Farenti	viateriai (F	21) (MLIN	M 121, 14	7) 0111	ess disturbed or problematic.
Type: NONE							
		-				Hudrin Cail	Present? Yes / No
Depth (Inches):		_				Hydric 30ii	riesenti res <u>v</u> no
Remarks:							



Wetland D (Off-site)



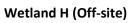




Wetland F (Off-site)



Wetland G (Off-site)



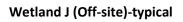




Wetland I (Off-site)



Wetland J (Off-site) -typical







Wetland J (Off-site)-typical

TABLE 2
Warden Waste Site
Proposed Mitigation

Stream	Stream	Proposed	Mitigation
ID	Type	Length/Acres	Type
ON-SITE		_	
I-4	Intermittent	2100 ft.	restoration
I-5	Intermittent	874 ft.	11
E-28	Ephemeral	994 ft.	11
E-29	Ephemeral	992 ft.	11
E-30	Ephemeral	147 ft.	11
E-31	Ephemeral	174 ft.	11
E-32	Ephemeral	252 ft.	11
E-33	Ephemeral	264 ft.	11
E-34	Ephemeral	228 ft.	11
E-35	Ephemeral	338 ft.	11
E-36	Ephemeral	784 ft.	11
OFF-SITE			
P-1 (Williams Ck)	Perennial	5509 ft.	restoration
P-2 (Kronos Trib)	Perennial	1184 ft.	restoration
I-6, I-7, I-8, I-9	Intermittent	3429 ft.	preservation
E-37 to E-43	Ephemeral	3848 ft.	preservation
Wetland G to J	PFO	3.77 ac.	preservation
Wetland D to F	II .	7.93 ac.	preserve/enhance
Adjacent Wet. D to F	II .	10.43 ac.	creation
TOTALS:	Perennial	6693 ft.	restoration
	Intermittent	2974 ft.	restoration
		3429 ft.	preservation
	Ephemeral	4173 ft.	restoration
		3848 ft.	preservation
		3.77 ac.	preservation
	PFO	7.93 ac.	preserve/enhance
		10.43 ac.	creation